ELECTRICAL REVIEW

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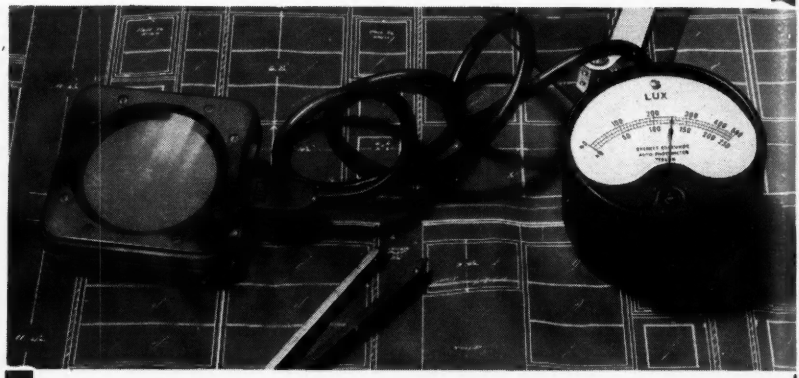

Above: *Autophotometer Model II. Portable Pattern with separate test surface for direct measurement of illumination. Send for Sheet 464A.*

On right: *Typical scale showing sensitivity at low illumination values.*

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ELECTRICAL REVIEW

Vol. CXLVII No. 3811 8TH DECEMBER, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

National Electricity Supply

POINTS IN THE B.E.A.'s SECOND REPORT

IN its second year of operation (the report on which is reviewed in this issue) the British Electricity Authority continued to be dogged by the effects of inadequate generating plant. Last winter there was a gap of 1,518 MW between capacity and potential demand ; with really cold weather the deficit might have been 2,140 MW. Only by shedding load at peak times and allowing voltage and frequency to fall was the system able to carry on. Operation was also rendered extremely difficult by the necessity for large transfers of power between Areas.

Plant Requirements

The Authority considers that an annual plant increment of 1,800 MW (sent out), against the current 1,000 MW, is needed to secure a balance ; until that is achieved load shedding and other undesirable expedients must continue, though on a diminishing scale.

In 1949–50 there was further electrical progress but the rate of advance slackened ; the year's sales rose by only 6·2 per cent as compared with 10 per cent in the preceding year. This slackening is attributable to a falling-off in sales to domestic consumers who took only 1·9 per cent more than in 1948–49. If this indicates a decline in public confidence engendered by the adverse publicity to which electricity supply has been subjected it is a serious matter for the whole electrical industry, as well as the B.E.A., and the trend must be countered.

It is worth noting that farm supplies (although a small proportion of the whole) rose by nearly 20 per cent ; about 9,600 farms were connected, bringing the total to 99,365. There was also a substantial increase (about 33 per cent) in consumption for public lighting.

One way of keeping down the price of electricity is to sell more kWh for each kW of plant installed. As a rough indication of the present situation it may be pointed out that the rise in sales during 1949–50 (6·2 per cent) matched up with a 6·8 per cent increase in output capacity.

Quality of Coal

On the other hand there are possibilities of lower production costs. It is pleasing to see the beginning of a correlation between the cost of coal and its calorific value. For many years now the first has rapidly risen while the second has sadly declined. The new policy of the National Coal Board should have a significant effect upon the B.E.A.'s works costs.

As the new generating plant comes into production and obsolescent sets are taken out there should be a progressive improvement in overall thermal efficiency which will help to offset the higher costs to the Authority of the new plant.

These costs have been the subject of discussions between the Authority and the manufacturers. As the largest buyer of generating plant, boilers and other heavy equipment the Authority is in a position to put pressure upon manufacturers in the matter of prices. It is said in the report that negotiations have been conducted with the aim of fixing fair and reasonable prices based on actual manufacturing costs. It is to be hoped that proper allowance will be made for all the charges which progressive manufacturers have to incur.

The Authority is entitled to a fair deal but so are the manufacturers. No attempt must be made by the Authority to use its power to force prices down to levels at which the manufacturers will be unable to continue research and development on an adequate scale. It is this which has kept Great Britain ahead in electrical technology and construction and has gained for this country the foremost place in world markets for electrical equipment.

DOMESTIC TARIFFS

One of the tasks which have occupied the attention of the Area Boards during the past year has been the simplification and standardization of tariffs. A number of revisions have already been made in the general direction of greater uniformity, such as by reducing some of the higher charges and raising those that were uneconomically low. On the subject of the standard domestic tariff which is aimed at several of the Boards have made known their preferences and last October the S.W. Scotland Board introduced a block rate tariff which replaced more than fifty existing scales. The South Wales Board has now announced its intention to bring into operation next month a similar tariff which will, however, be confined at present to the West Wales Sub-Area. As in the Scottish case the primary charge is based roughly on a consumption of 10 kWh a room per quarter. One difference is that the South Wales Board has been persuaded by the Consultative Council not to make a higher charge for prepayment supplies, except that quarterly accounts are subject to a $2\frac{1}{2}$ per cent prompt payment discount.

SUPERCONDUCTIVITY

No one has so far offered a really adequate theoretical explanation of the loss of electrical resistance in a metal when reduced to very low temperature. In seeking for more complete knowledge of this and other phenomena at temperatures near the absoluts zero the U.S. National Bureau of Standarde has studied the transition temperatures at which different isotopes of the same element change from their normal to the "super" state. The results have, wholly unexpectedly, indicated that superconductivity is related to the constitution of the atomic nucleus, not exclusively to the electronic configuration outside the nucleus as hitherto supposed. The true significance of this relationship to mass is not yet clearly understood, but it may be associated with an increase of atomic spacing due to stress.

NEW WAGE AGREEMENT

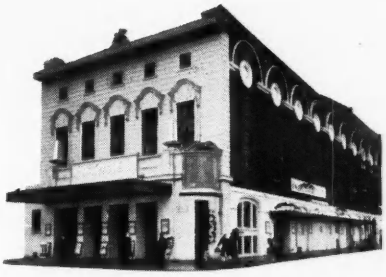
While the new agreement on wages in the engineering industry does not give the men all that they asked for, most of them will benefit from the new arrangement. The consolidation of the minimum time rate and the national bonus is recognition of the fact that any fall in the cost of living is remote, and it removes a complication. The lower increase granted to unskilled workers ensures the maintenance of the "differential" between them and the skilled ; the differences between certain trades and grades will also be maintained. Higher-paid workers benefit proportionately less than others, with the result that in each class there is a certain levelling-up. What the increases represent in the way of increased production costs is unknown as yet. It will, however, not be so much as conceding the original claim would have involved.

I.E.E. BENEVOLENCE

The income to the I.E.E. benevolent funds —general and homes—from all sources during the year reported upon at the recent annual meeting increased appreciably, but the total included refund of income tax for the current year as well as arrears of the previous twelve months. Still more pleasing therefore is the growth of the number of contributions—963 more than during the year before—although even this increase is not proportional to the growth of the Institution's membership. If those who have not yet subscribed could make a donation now, however small, they would be performing an act of kindly goodwill appropriate to this season of the year.

The "OLD VIC"

Electronic Stage Lighting Control Installed



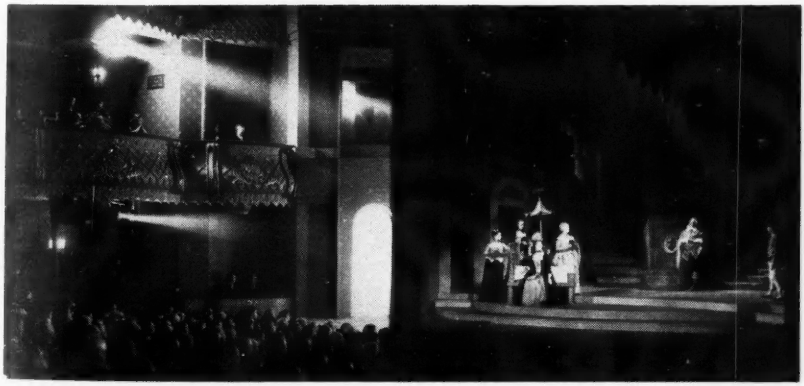
THE re-opening of the Royal Victoria Theatre, better known as the "Old Vic," in Waterloo Road, London, is an event of especial interest from the electrical as well as the theatrical point of view. First opened in 1818 as the Royal Coburg Theatre, it became known as the Royal Victoria Theatre in the 1850s and was taken over by Emma Cons. On her death in 1912 the theatre passed into the hands of Lilian Baylis who gave it a national as well as local reputation with her programme of Shakespeare and opera.

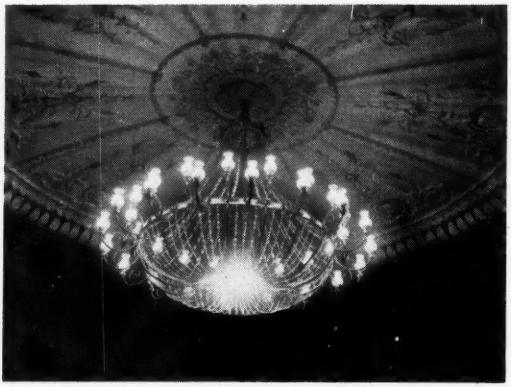
In June, 1941, a German land mine caused extensive damage. Re-opened last month after restoration, the theatre has been re-equipped electrically and now has one of the most up-to-date stage lighting control systems yet devised, involving the use of thyratron valves for remote control in place of manually operated wire-wound resistances.

This system of control, which was described in detail in our issue of 19th August, 1949 (page 341), was first employed in the National Theatre, Iceland, but ten installations have either now been completed or are in hand in Great Britain, including the New Theatre, London, and the Shakespeare Memorial Theatre, Stratford-on-Avon. The scheme at the Old Vic is among the most extensive so far undertaken, providing for the control of 144 lighting circuits in duplicate.

The control panel is situated in a small room at the back of the circle, the operator having a clear view of the stage through a window. Each of the two panels measures 2ft 8in by 2ft with a working area of 8·6 sq ft compared with 18ft by 7ft and a working area of 146 sq ft for the usual manually operated board. The control for each circuit, comprising a three-position switch and a dimmer, occupies a space of only 6½in by 1in, compared with about 2ft by 1ft for a hand operated dimmer control.

Four-colour spotlights are fitted under the circle and balcony





Specially designed crystal chandelier installed in the auditorium

Apart from the saving in space involved the system enables the operator to manipulate many more circuits than is possible by other methods, while the duplicating of the boards permits the preselection of circuits. Change over from one board to the other is effected either by a simple lever or, for slow work, by a hand wheel. Among the many special features, master dimmers allow any circuits to be dimmed while others are simultaneously brightened, without interfering with any preselection on the duplicate board.

The three banks of thyratrons (44-way each duplicated) together form a board 27ft long by 6ft high by 2ft wide, which is located in an extract-fan-ventilated room in the basement. Each tube (made by Standard Telephones & Cables, Ltd.) handles a 230 V circuit of anything up to 2 kW.

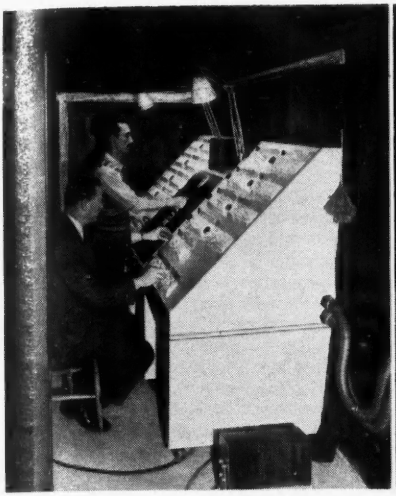
At the moment only 120 of the possible 144 circuits catered for have been provided, halt of them on the stage and half in front of the stage. The stage lighting comprises a cyclorama batten (32 kW at top and 6 kW at bottom), No. 1 batten (a composite unit comprising three floodlight circuits and three battens, arranged alternately, totalling altogether 12 kW), No. 2 batten (6 kW), dips (20 kW a side) and various sockets giving up to 48 kW for incidental lighting. Provision is made for the connection of portable switchboards for up to 18 kW of portable lights.

Fore-stage cove lighting designed by Pierre Sonrel is a novel feature of the front of the house illumination which comprises in addition twenty spotlights. Fourteen of these, four each side under the balcony and three each side under the gallery, are equipped for remote four-colour change. Suspended from the centre of the auditorium is an attractive crystal and metal chandelier weighing 1½ tons, specially designed to harmonize with the surroundings. This and other decorative fittings installed in the auditorium were designed and manufactured by Jack Schrier, while in the vestibule the original chandelier has been salvaged and reconditioned. Courtney Pope louvred fittings are employed for the maintained lighting. To illuminate a series of paintings in the bar tracing the history of the bombing and reconstruction fluorescent fittings are employed. Incidentally the bar is equipped with Heatrae electric urns and an Express service lift.

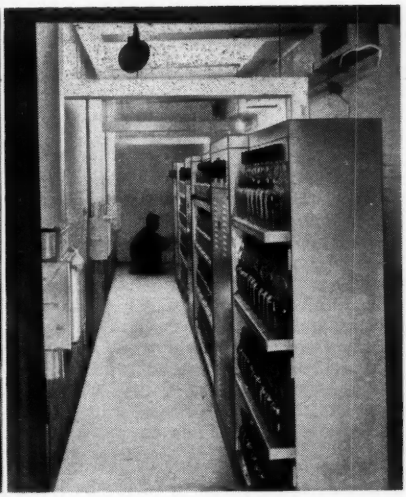
From the prompt corner it is possible, with the aid of a switchboard operated on 12 V, to cue twenty-two different positions and there is a loudspeaker intercommunication system with the operator of the lighting control, a 42 line internal telephone system (General Telephone Systems, Ltd.) providing for communication between other parts of the theatre. No stage sound amplification is provided. Duplicate control for a stage lift (Knight's Theatre Equipment Co.) carrying up to fifty persons is effected either from the prompt corner or from the front of the house.

Two separate supplies of electricity for the theatre have been arranged, one for the stage and one for the front of the house. The stage intake is served by two alternative 400 V, 3-phase feeders giving up to 244 kW. From the English Electric 450 A main isolator, the supply is taken to three Bill 150 A triple-pole switch fuses and thence to metalclad switch fuses for distribution to the individual services. In the front of the house intake, equipped throughout with Bill switchgear, provision is made for 200 kW of load for lighting, heating, water heating, etc. Following modern practice the meters have been incorporated in the busbar chamber and h.r.c. fuses are employed on all circuits above 100 A.

Extensive use of trunking has been made in the installation and altogether about



The stage lighting control panel covers 120 circuits in duplicate with room to expand



The three banks of thyratrons employed for the stage lighting control

1,000ft of Power Centre trunking has been accounted for. In addition about 12,000ft of conduit has been installed and 135,000ft of cable (mostly Craigpark). A mercury arc rectifier provides the necessary direct current for a reconditioned 6 h.p. motor which formed part of the original extract fan installation. Apart from carrying out the complete rewiring scheme within four months, the Strand Electric & Engineering Co., Ltd., manufactured and installed the whole of the stage lighting equipment and the special control gear.

The prompt corner with cueing and stage lift controls. Communication with the operator of the stage lighting control is by means of an intercommunication loudspeaker

Mines Report

THE report of H.M. Principal Inspector of Mines (Mr. J. Cowan) for the year 1949 is now available from H.M. Stationery Office, price 1s. In the compilation of this report 1,521 inspections were made of which 697 were on the surface and 824 underground. In addition, 18 inspections were made at metalliferous mines and 540 at quarries, while 195 days were spent in attending inquests, visits to manufacturers' works, and conferences. The installed capacity of electric motors at 30th June, 1949, stood at 2,981,791 h.p., representing 35,947 motors on the surface and 51,831 underground.

Only one fatal electrical accident was reported during the year. It occurred underground when an electrician received an electric shock when locating a fault in a gate-end switch. In addition to this, however, a fatal electric shock accident occurred on the surface involving a child. Of the 62 non-fatal accidents involving injury to 68 persons, 25 occurred on the surface and 37 underground involving 26 and 42 persons respectively. Nine dangerous occurrences were reported.

VIEWS on the NEWS

By REFLECTOR

PRONOUNCEMENTS upon the possible date when electricity generation will balance demand, and load-shedding become unnecessary, continue to be made. In the House of Lords last week that date was said by Lord Shepherd (for the Government) to be much nearer than anybody in the industry had hoped—next year in fact. Unfortunately the noble lord was in error, as he confessed next day, and he repeated the doleful story that electricity cuts must be expected for several years ahead.

* * *

Another sad commentary on present-day conditions appears in the correspondence columns of the *News Chronicle*. "In spite of the present high cost of municipal housing," says the writer, "many local authorities are providing built-in refrigerators for their tenants at a low weekly rental. An owner-occupier cannot even buy the particular model which is available to local authorities; he must be content with a model not suitable for building in—at nearly twice the price." There are many kitchens in which there is no room for refrigerators unless they are built in. Are manufacturers able to make built-in models for local authorities but unable to produce them for private individuals? And if so, why? Incidentally the whole situation will be much helped when the authorities do finally make up their minds that a refrigerator is a necessity rather than a luxury (as they periodically show signs of doing) and, I trust, remove the purchase tax.

* * *

The idea that "cheap power" is a factor influencing the promotion of industrial development in any particular region or area is scouted by the *Electrical World* which estimates, from a recent survey, that the average proportion of electricity in the cost of industrial production is little more than 0·5 per cent. Manufacturing costs in the industries surveyed are analysed in tabular form. These tables are interesting inasmuch as they show very wide variations in the proportion represented by electricity in total costs. Apart from the electro-metallurgical industries in which the percentage is naturally large (13·60 in the case of primary aluminium) some of the highest figures are in the building materials industry (e.g., hydraulic cement 4·17 per cent; lime 2·98 per cent). The lowest proportion seems to be in the tobacco industry (from 0·06 to 0·23 per cent). In the electrical equipment and supplies industry itself the general average holds good, the range in the various branches being from 0·36 to 0·75 per cent, the higher figure pertaining to the lamp industry.

* * *

In a letter to *The Times* last week Mr. A. G. Heslop, president of the Coal Merchants' Federation, condemned the "squandering" of coal in the home "through the medium of gas, and especially electricity." After what has been done by the electricity authorities to discountenance domestic electric heating it was very unfair of Mr. Heslop to accuse the B.E.A. of pursuing a reckless policy by encouraging the use of electricity for space heating. Mr. Heslop says it is time to impose a "purchase tax" on the domestic use of electricity and he puts forward an idea which I thought had been exploded long ago—that above a certain consumption the price should be sharply raised. Rationing by price is surely a pernicious course to adopt. The writer of the letter also overlooks an important point: the coal used for the generation of electricity is hardly of the kind which coal merchants would supply for industry or the home, I hope.

* * *

Mr. Philip Noel-Baker, speaking at last week's luncheon of the Batti-Wallahs' Society, expressed his relief in being able to speak on the Cambridge of Rupert Brooke, with whom he was contemporary, instead of his almost day to day utterances on power cuts and fuel economy. His enthusiasm for Cambridge and its traditions found expression in an address which delighted his listeners and I, for one, welcomed his departure from a subject which, however important, is hardly one which goes with good digestion.

Automatic Computer

Pilot Model at National Physical Laboratory

ON a recent visit to the National Physical Laboratory, Teddington, we saw a demonstration of the pilot model of the automatic computing engine (ACE), the construction of which has just been completed. The ACE itself will be built later, but the pilot model is a complete computer and has already been used for solving some problems. We understand that the superintendent of the Mathematics Division, N.P.L., will be glad to hear of industrial problems whose solving requires lengthy and intricate arithmetical calculations.

Much has been learnt in the building of the pilot model and it is clear that use and improvement will go hand in hand for some years. The ACE itself, for example, will be improved in reliability by the re-design of certain parts; it will be faster and its memory capacity will be greatly increased by the addition of an auxiliary magnetic recording storage system.

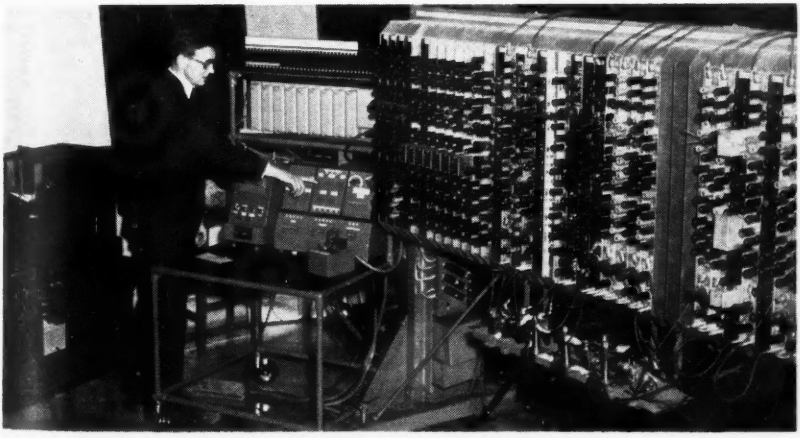
The ACE is extremely versatile and is the fastest and most powerful machine of its kind. Unlike some similar machines which can only deal with one recurring problem, it can tackle any problem requiring arithmetical calculation. All mathematical calculations in the end resolve themselves into addition, subtraction, multiplication and division, so that for practical purposes there is no limit to what it can do in this field.

The prodigious speeds at which the ACE works are made possible by the use of radio valves and modern electronic techniques. The speed is too great to be stated in ordinary terms, but some idea can be gained by considering the multiplication together of two ten-digit numbers. This would take a skilled arithmetician about eight minutes. A desk calculator would take about a minute, while the ACE would do it in about 0·002 sec.

In operation the machine uses 1 Mc/s pulses to indicate the figure 1, while the gaps are used to indicate the figure 0. All calculations are done using only these two digits, in what is known as the binary scale. When a sum is put into the machine the numbers are first translated into the binary scale and, after completion of the calculation, the result is re-translated into ordinary numbers.

The machine necessarily has a " memory " to enable it to carry out long sequences of operations. For example, it may have to

Pilot model of the ACE at the National Physical Laboratory



combine the results of a dozen or more separate calculations and since it can do only one computation at a time it must remember each one until it is wanted.

This " memory " is, in effect, the numbers, in the form of electrical pulses, " shunted " into closed loops where they continue to circulate until required. If necessary they can be retained for hours. If the same number will be wanted again later on, it can let out a copy of itself and then continue to circulate. Actually, the electrical pulses that have to be remembered are converted into supersonic waves in a mercury column ; if they were left as electrical pulses each loop would have to be 186 miles in circumference.

Method of Operation

Instructions are given to the machine by coding them as holes in cards and using the holes to make electrical contacts. The cards are fed into a specially adapted Hollerith accounting machine connected to the ACE. The holes in the cards start momentary electric currents which release corresponding trains of pulses which are then distributed to and stored in the memory loops. As soon as the ACE is loaded with numbers and instructions it begins on the calculations. The results are passed back to the Hollerith machine which punches another set of cards in accordance with the impulses received from the ACE, and translates the punched holes into ordinary printed numerals. The ACE can only calculate with binary numbers but the input and output arrangements are such that it can convert decimal numbers into binary form and vice versa. The machine is completely versatile in this respect and can accept input numbers and instructions in either binary or decimal form, or even one in binary and the other in decimal at the same time. The output also can be in either form.

The mechanism that controls the sequence of the calculations is far more complicated than the calculating mechanism itself. The preparation of the instruction cards is a specialized job sometimes requiring considerable mathematical ingenuity. Instruction programmes for standard calculations are made and stored in a library. For a particular programme the instructions are assembled from these prefabricated units, and linked together by special instructions. The library already contains many prefabricated units ready for use.

Human computers are liable to make mistakes and so is the ACE. They can be detected and corrected in both cases. Mistakes are no special problem with such machines and the checking can be done as fast as the actual calculations.

The idea of such machines was conceived by Charles Babbage some 130 years ago and his ideas are still basic to all modern machines. He spent many years trying to construct a machine but failed ; the knowledge to translate his ideas into " hardware " did not then exist.

The basic conception of electronic computers was described by Dr. A. M. Turing, now at Manchester University, in 1936 in a very abstract paper. Work was held up during the war but in 1945 the idea was taken up again by Mr. J. R. Womersley, superintendent of the Mathematics Division of the N.P.L. Dr. Turing joined the N.P.L. and he and his colleagues continued to work toward the practical realization of the idea by theory and experiment.

Trial Construction

By 1947, the plans for realization were sufficiently advanced to warrant a trial construction and a special group known as the Electronics Section was set up to carry it out, under the supervision of Mr. F. M. Colebrook. The Section is a composite group with four mathematicians led by Mr. J. H. Wilkinson, ten electronic engineers led by Mr. E. A. Newman, and a small group of development engineers from the English Electric Co., Ltd.

The pilot model of the ACE comprises about 40 plug-in chassis on a rack about 12ft long with a separate control desk and power supply unit. The machine uses about 800 valves (as opposed to 20,000 in the slower American ENIAC) and consumes about 5 kW. It has a memory capacity of 8,000 binary digits in supersonic delay lines of mercury in steel tubes. The whole machine occupies an area of about 60 sq ft.

Lecture for Schoolchildren

A CHRISTMAS lecture for older schoolchildren has been arranged by the Institution of Electrical Engineers, and will be given in the lecture theatre of the Institution on the afternoons of 2nd and 3rd January. The lecturer will be Dr. W. Wilson (manager of the Development Laboratory, G.E.C., Birmingham), and his subject will be " The Electric Current, its Action and Nature."

ELECTRICAL CONTRACTING: Organization and Routine

By H. R. TAUNTON, A.M.I.E.E.

18.—*Labour : Assistants and General Conditions*

SOME electricians think they must have an assistant on any job. A big, strong man will—if he is allowed to—trail a mate after him to relieve him of the strain of carrying a yard of flex when he is sent out to re-wire a standard. But a man cannot erect conduit and draw in wires single-handed ; he must have an assistant : a mate, labourer, boy, or apprentice.

"Mate" is the colloquial term for what the N.J.I.C. agreement defines as an auxiliary workman over 21 years of age (other than apprentices). The trade union does what it can to encourage the employment of mates rather than boys, while contractors as a whole avoid it as much as possible. The reason is simple : an electrician's assistant has no responsibilities, no duties to perform, which a practically untrained boy cannot undertake. No reasonable employer will pay an "adult mate" nearly 3s an hour to lounge against a stepladder and pass an occasional tool to the wireman aloft.

Mates and Apprentices

In theory, a mate is allowed to carry out any "work of which he may be capable," under the eye of his journeyman. He is not allowed, however capable, to work by himself. In practice, therefore, he is given no chance to do anything but dance attendance on the journeyman. He may—again, in theory—become in time a qualified electrician, but he is not encouraged to do so by anybody. The youth who drifts into the grade of mate may drift along in it indefinitely, and often is incompetent to do anything else. In effect, there is little room for the mate in the organization of electrical labour. Boys under 21 can do all that he can do for half his pay, and above 21, when officially he comes into existence, he can and should as far as possible be displaced by apprentices.

Since no reputable firm of contractors will indenture more apprentices than it has foremen to train them, it follows that, failing mates, they must fill up the ranks of the necessary assistants with boys, under Categories II and III. A boy should only be engaged if he has a reasonable chance of making good and ultimately becoming an electrician. A few months will show whether he has the right stuff in him. If he has not, let him go at once, to find his vocation elsewhere. Otherwise give him the chances of experience which are given to an apprentice, and when he comes of age let him have the further chance as mate of "picking up his tools." At least he will have been given a square deal.

Boys or apprentices cannot do the rough, heavy work sometimes necessary on contracts, and which skilled men cannot be asked to do, even if it were an economic possibility. For work like trenching, overhead construction, and so on, labourers have to be employed. If the firm's turnover in a particular kind of work permits the regular employment of a few such men, so much the better, but usually casual labour must be engaged for individual contracts. If the number of men required is fairly large, it is advisable also to engage an experienced ganger, who will probably be able to handle them better than the electrical foreman.

The normal and desirable way to recruit the ranks of the qualified electrician is by apprenticeship, in conjunction with a course of training in technology.

New Training Scheme

As from 1st September this year, would-be apprentices must be registered through the new Apprenticeship and Training Council in one of two classes : one, of youths bound under indentures, and the other, of those engaged on the understanding that they will be employed for a full period, subject to their conduct being satisfactory ; otherwise they will be given the same facilities as those in the first class.

Normally, after a short probationary period, apprenticeship will be for five years, ending at 21, at an agreed rate of wages

ranging from 12 to 60 per cent of the basic rate plus a percentage of any additions payable to journeymen. Technical instruction is compulsory for two or more years, the employer providing facilities and fees.

Practical training is perhaps more important than technical. A lad cannot serve five years with a firm carrying out large and varied installations without picking up something of the theoretical basis of it all, while he might spend five years in a day-school of technology and not be able at the end of it to handle a screwdriver properly. It follows that the firm with which he is indentured ought to be one which will give him real opportunities of gaining varied experience. A small firm handling small work cannot do that, but it is usually among such firms that the conscienceless practice is most common of taking on more apprentices than there are foremen to train them.

The practical training of the boys is mainly the responsibility of selected foremen to whom they are attached, but they should not remain too long with any one man, however competent, but be given the chance to learn the methods of others ; nor should they be kept too long at one class of work. The object is to train them to be all-round men. At some time during his training the apprentice should be given a few months in the stores ; and if he is a youth of exceptional promise he may in his last year be given a chance in the office, on the drawing-board and in the estimating department, to learn the inner working of the contracting trade. It will be useful to him as a future foreman, and may be the stepping-stone to higher things.

Evening Classes

Technical classes are available in all large towns, and practically all start their courses in September. Apprentices, therefore, ought not to be sent away on country jobs during the winter season. It is very desirable that any course should be directed towards a final examination by a recognized body ; and the E.C.A., in conjunction with the City and Guilds Institute, has drafted out a very complete syllabus with that principle in mind. Course B, which is that which apprentices are expected to take, is designed to cover three years of three evenings a week. At the end of that time an examination in theory is set by the Institute and certificates are awarded on the basis of the result and of the student's past practical work. An " interim " certificate may be exchanged for an " electrician's " certificate on the recommendation of an advisory committee, under certain conditions.

There is a further course, C, intended for those who desire to qualify for higher positions, such as that of foremen, and designed to cover two years of three evenings a week. It leads, by a similar procedure to that of Course B, to an " electrician's *extra* " certificate. Further details are obtainable from the pamphlet published by the City and Guilds of London Institute, Department of Technology : *Programme C*, pp. 43 to 54.

When the lad has completed his apprenticeship—is " out of his time "—it is customary to let him work for a clear year at mate's rate before taking up his tools as an electrician. During that time he should be given every chance of proving the results of his training. Until he has accumulated a certain amount of independent experience he is obviously not worth to his employer—his late master—the full rate of an electrician. For the year's interim, therefore, the mate's rate is a fair compromise. It is the employer's clear duty, however slack trade may be, to keep him in continuous employment during that year. At the end of it, if he has proved his worth, he will probably be taken on as a fully-paid man—and gladly. A firm's old apprentices are the most likely to give it loyal service.

Employment Conditions

The accepted conditions of employment of labour in the electrical contracting trade are those agreed between the National Federated Electrical Association, representing the employers, and the Electrical Trades Union, representing the men, associated in the National Joint Industrial Council. The working rules are now more or less standardized, while the basic rates of pay, with an " addition " to cover the varying cost of living, are revised from time to time. They vary somewhat in different parts of the country, according to a definite scale.

The inclusive rate for electricians in the London area (Grade A, the highest) is now 3s 4d an hour for a 44-hour week. This may be compared with 1s 10½d for a 47-hour week at the beginning of the war ; or, as a point of interest, with 10½d for a 53-hour week before the first world war. The present rate marks a definite gain by the men. No sensible employer will grudge it them. No craftsman deserves a higher rate of pay

them the electrician, whose work calls for so high a degree of manual skill and technical knowledge, and is so essential to the modern community.

What irks the thinking employer is not the high rate he pays his men, but the suspicion that a deliberate policy of restriction has resulted in shorter hours and higher wages being accompanied by reduced output. There is no contractor of experience but is convinced that the men do not give as much as they used to for half the money. That conviction may be exaggerated by the tendency of ageing memory to glorify the past, but there is little doubt that it has foundation in fact. A factor in reduced output is the shorter week. We were fervently assured that an eight-hour day would, by increasing the efficiency of the men, leave the day's output unaffected. But experience has clashed with this plausible theory. By some perverse reaction, every improvement in hours, pay, and conditions has the effect of making the men more unwilling than ever to give a comparable return. Incidentally, the shorter week automatically increases the contractor's standing charges.

Overtime and Output

The working rules agreed for the various districts can be found in full, together with the National Agreement as to Overtime, Night Shifts, Country Allowance, etc., in the *E.C.A. Year-book*. The reputable contractor will know those of his own district, and observe them scrupulously. Although overtime is officially "deprecated by both parties," neither is averse to it when it suits them. Whatever their leaders' theories on the subject, the men individually are anxious to book overtime. For the contractor, even when it can be charged for at daywork rates, overtime is a doubtful luxury. He is not merely paying 50 per cent or 100 per cent more than the usual rate, but in practice two or three times what the work done is worth. The upshot is almost always difficult argument with an astonished and dissatisfied customer. Output falls enormously, not only during the actual overtime, but during the normal day following. It is not to be expected that a man working all hours of the night can carry on indefinitely with undiminished vigour. And output on overtime —and on night shifts—is further reduced by the lighting conditions.

Men working in the country are naturally anxious to return home on their paid Bank holidays, particularly at Christmas and Easter. They can always do that, of course, at their own expense ; but as far as possible, the rule providing for the employer's payment of their return fares at certain intervals, according to distance from the shop, should be made, by a little mutual adjustment, to fit in with these holiday times. This rule, by the way, is apt to be overlooked by estimators.

" Dirty money " is sometimes a disputable point. It is curious how finicky some men become about the cleanliness of their working conditions when the extra pay is in question. For the contractor, however, it is good policy to give the most generous interpretation to the rule—not forgetting to allow for his generosity in his estimate.

Avoiding Friction

Indeed, of the rules in general, a generous interpretation is always to be recommended. It is not to be expected from the men, if only because, broadly speaking, they can afford it less than the employer. If he is equally insistent on the last iota of his rights, he will find himself continually distracted by petty disputes, culminating perhaps in friction with the trade union, a thing to be avoided. If the men's right to organize themselves for the protection of their interests is conceded, as it must be by all but the most reactionary, a spirit of friendly co-operation with their organization is surely better than the suspicious antagonism so common. That applies with equal force to the other side. After all, both the employers' and the men's organizations have the same aim : to increase to their mutual benefit the amount of electrical work done.

Though extremists may sneer at it, kindly sentiment is still possible in the robotized conditions of modern civilization. Employers can, and often do, take a personal interest in their workers as individuals ; and workers can be, and sometimes are, influenced by feelings of loyalty to a particular employer. Among the factors that foster mutual goodwill, continuity of employment is perhaps the most potent. Loyalty is not to be expected from casual labour ; but the man long employed by a firm that treats him fairly usually develops a feeling for it which can only be called loyalty, though he himself might scoff at the word.

It is impossible to give continuity of employment to all the men on the outside

staff; but all firms should have a nucleus of selected men, foremen and electricians, for whom work can and must be found in the slackest times, and who, at other times, will leaven by their spirit the supernumeraries.

Willingness to sacrifice immediate profit in order to avoid discharging them; generosity when the occasion calls for it; justice at all times; ready praise and limited rebuke: all these the men are quick to note and to appreciate, and all bring their reward in the heartier co-operation that appreciation fosters. Here and there a contracting firm—necessarily of the largest, with the capital and organization which enable them to indulge in experiments which their humbler co-traders can only admire—here and there a firm has adopted more tangible methods of improving the conditions of employment: profit sharing, savings and endowment schemes, benevolent funds, and so on.

Other firms set out to secure efficiency from their employees by the issue of printed regulations. The principle is a good one; but the regulations should be as few, and as short and simple, as possible. Long and complicated codes have no chance of being remembered and observed, and can only be irritating to a competent workman.

The few essential ones which affect all grades of the outside staff may very well be printed on part of the back of the time-sheets, to which they will chiefly refer. Others, intended for the guidance of foremen and charge-hands, and of men working "on their own," may conveniently take the form of a short—very short—pamphlet. They will relate not at all to the practical work—the specifications they are working to, the engineering staff, and their own experience should be their sufficient guides in that—but solely to day-sheets, requisitions, advice-notes, and other items of the routine adopted by the firm, covering as far as they can without undue prolixity the several points already mentioned in discussing the duties of foremen, not all of them obvious, and some perhaps peculiar to the organization adopted by the firm.

It would be interesting to consider what might be the contents of a pamphlet drafted by the foremen for the guidance of their employers. One point it would certainly make, though no wise contractor needs to have it stressed: that the goodwill of his business depends, not so much on the material he uses, as on the labour he employs. It is on a satisfied body of labour, ever better trained to work under ever improving conditions, that the industry at large depends for its continued prosperity.

INDIAN ELECTRICITY CONTROL

ADDRESSING the annual general meeting of the Federation of Electricity Undertakings of India in October, Mr. Noel Paton said that since the last meeting the Madras Electricity Supply Undertakings (Acquisition) Act had been passed. He trusted that the Madras Government would leave most of the licensees to continue their service until their franchises expired. The Act was primarily an enabling measure. Also since the last meeting, the Central Electricity Authority had come into being but no State Electricity Board had yet been constituted and the period for their appointment had been extended to 31st March, 1951. He hoped that there would be no further delay in the case of the "Part A" States (the former Provinces) in appointing Boards which would set in motion the consultative machinery through which the electricity industry would be represented.

Mr. Paton said that there seemed to be little chance of getting the State Governments to reconsider their policy and to relieve electricity from taxation. State Finance Ministers appeared to give little regard to the hindrance they were placing, by growing taxation, on the development of electricity in the country. What chances of relief they hoped to have from this impost would depend upon the recommendations of the Local Finance Inquiry Committee before which the Federation had already placed its views.

Productivity Measurement

IN any endeavour to raise productivity some means of gauging results must be available. To this end the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1, has published a report ("Productivity Measurement in British Industry," price 2s) comprising six papers on the general subject and on applications in particular industries. The subjects, prefaced by an explanatory introduction, are:—"Assessing Progress by Indexes," "Comparisons Between Factories," "An Index in a Steelworks," "Raising Production per Man-Hour," "Surveys in the Boot and Shoe Industry" and "Cotton Mill and Operative Productivity."

Electricity Supply in 1949-50

Second Year of Nationalized Service

DETAILED information on all aspects of electricity supply for the year ended 31st March last is contained in the reports of the British Electricity Authority and the fourteen Electricity Boards which are now available, with that of the Minister of Fuel and Power, from H.M. Stationery Office. In the space at our disposal we are able to give only the broad outlines of the main report; the Boards' reports will be reviewed in subsequent issues.

At the close of the period the B.E.A. owned 293 power stations with an installed capacity of 13,784 MW and an output capacity of 12,337 MW, the latter representing a net increase of 6·8 per cent during the year. Over a third of the generating sets and boilers (11 per cent of total capacity) were over 25 years old and more than half the sets (over 10 per cent of capacity) were rated at under 8,000 kW. About a quarter of the stations generated 90 per cent of the total output.

During the year 1,000 MW of new plant was installed in 21 stations, giving extra output capacity of 831 MW. Three new stations—Walsall, Littlebrook "B" and Staythorpe—were opened and at the close of the year 43 new stations and 27 extensions were being constructed. About 60 MW of plant was closed down.

Although the rate of plant installation improved considerably in 1949 it was not as high as had been planned and at the end of the year a total of 2,672 MW was outstanding from the 1946–49 programmes. In the winter of 1949–50 there was a deficit of 1,518 MW at the time of maximum demand (against 521 MW in the previous winter). If the weather had been more severe and

TABLE I.—CONSUMERS AND SALES

Class	Number of consumers 31.3.50	Per cent inc. on 1948-49	Sale of electricity 1949-50 Million kWh	Per cent inc. on 1948-49
Industrial	177,958	3·3	20,784	8·0
Commercial	1,230,821	2·9	5,072	10·0
Farm	99,365	10·7	372	19·6
Domestic	11,122,545	3·7	13,460	1·9
Traction Rail*	79	—4·8	885	6·4
Traction Street			546	—4·5
Public lighting	3,499	5·6	360	32·8
Totals†	12,634,267	3·7	41,479	6·2

* Including direct sales by the B.E.A.
† Excluding small supplies to N. of Scotland Board.

Members of the British Electricity Authority

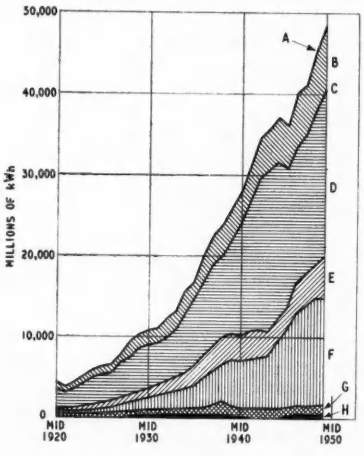
Back row: Mr. L. Howles, Mr. C. R. King, Dame Caroline Haslett, Sir Norman Duke, and Mr. Norman Elliott. *Front row:* Lt.-Col. E. H. E. Woodward, Sir Henry Self (deputy-chairman, administration), Lord Citrine (chairman), Sir John Hacking (deputy-chairman, operations), Mr. E. W. Bussey and the Rt. Hon. T. Johnston. (Alderman Sir William Walker, the other member, does not appear in the photograph.)

there had been no load spreading there would have been, it is estimated, a deficit of 2,140 MW. Estimates made at the end of March last put the possible shortage at peak times, should extremely cold weather occur and no load spreading arrangements be in force, at 1,889 MW in 1950–51, 1,748 MW in 1951–52 and 1,702 MW in 1952–53. There was a further reduction in the loss of capacity during the peak-load month of January—to 11·4 per cent.

Programmes for 1954 and 1955 were prepared during the year having regard to manufacturing capacity and taking into account plant from earlier programmes which would not be completed until those years. On the latter account it was found necessary to reduce the 1953 programme from 585 to 215 MW. This, with uncompleted plant from earlier programmes, represented the maximum that could be supplied by manufacturers in that year.

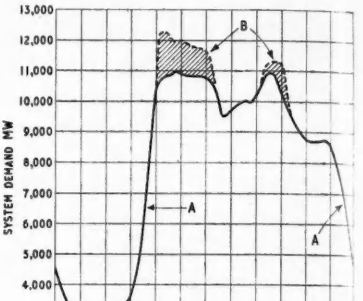
The difficulty of finding sites for new power stations continues to be a major problem. Investigations have shown that some Areas are better endowed with potential sites than others, which will necessitate an increased use of transmission between Areas.

The cost of buildings and plant continued



Development of electricity supply in Great Britain, excluding N. of Scotland District. (Figures plotted at mid-year)

A. kWh generated. B. kWh used at power stations or lost in transmission and distribution (less outside purchases). C. Total sales to consumers. D. Sales for industrial purposes. E. Shops, offices, public buildings, etc. F. Domestic and farm purposes. G. Traction. H. Public lighting



Variation of system demand on Monday, 31st January, 1950

Curve A = Demand actually met. Shaded Area B = demand shed

to rise and it was estimated that the figure of £50/kW given in the Authority's first report would be exceeded in the 1950–53 programmes and would amount to about three times the pre-war figure. Capital contracts approved in 1949–50, largely in respect of plant to be commissioned in 1952–54, amounted to £68 million (against £42 million in 1948–49); about a quarter of this represented civil engineering and building works. Reference is made to the taking over by the B.E.A. of the responsibilities for progress in building and civil engineering works and plant production in manufacturers' works, as well as the allocation of steel and timber within the industry.

In its endeavours to expedite manufacture and construction and reduce capital costs the Authority maintained close co-operation with individual manufacturers and their associations. Joint committees with the associations were particularly concerned with terms and conditions of contracts and standardization and its possible effects upon costs.

It is stated that as a result of "frank discussions" between members of the Authority and the principals of a number of the chief manufacturing concerns "some progress has been made towards establishing a position in which the manufacturers will produce evidence satisfactory to the Authority of the actual manufacturing costs involved, so that these, together with estimates of future trends, can be used as the basis of fixing fair and reasonable prices." Particular reference is made to negotiations

with the B.E.A.M.A., C.M.A., E.L.M.A. and the Water Tube Boilermakers' Association.

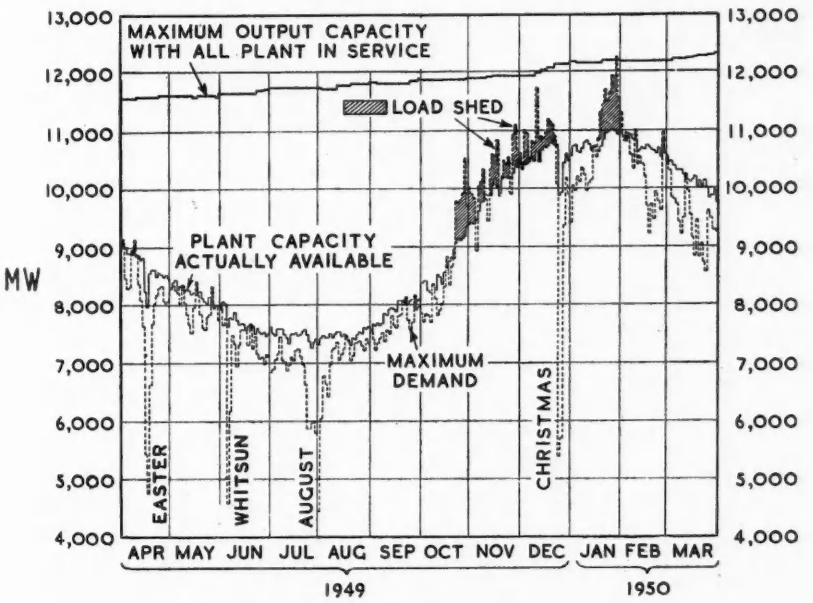
Work proceeded on the standardization of dimensions of equipment where interchangeability is desirable and on the rating and performance of equipment to safeguard the interests of consumers.

Rationalization of plant design progressed sufficiently to permit the preparation of standard specifications for boilers, turbines, alternators, switchgear and other important items. A major proportion of the new plant will be of the single boiler, single turbo-generator class. Three-quarters of the plant included in the 1953–55 programme was in respect of standard 30 and 60 MW sets. The non-standard sets comprise necessary duplicates of existing sets and a number of new designs to encourage development of plant operating at advanced steam conditions.

One of the new stations (Castle Donington) will have 100 MW sets each with an 830,000lb/hr boiler; the steam conditions will be 1,500lb/sq in and 1,050 deg F. Investigations into the possibilities of re-heat sets and boilers have been continued.

The thermal efficiency of the Authority's steam stations was 21·30 per cent in 1949–50, compared with 21·15 per cent in the preceding year and the average works cost per kWh fell from 0·4981d to 0·4872d—a reduction of 2·2 per cent. Fuel costs per kWh were reduced by 2·7 per cent, partly because of improved efficiency and partly because the average price of coal and other fuels fell by 1·9 per cent. The overall cost per kWh increased from 1·19d to 1·20d.

Coal consumption in 1949–50 was 29·24 million tons, a large proportion of it being of low quality; graded coals represented 9 per cent, cleaned smalls 28 per cent and uncleaned smalls 63 per cent. About 16 per cent of the total was opencast coal. Although the average delivered price of coal fell by 1·4 per cent it was still more economical to use such higher grades as could be obtained. It is pointed out that the flat-rate increases imposed in 1948 and 1949 bore hardly upon



Plant capacity and demand during year ended 31st March, 1950

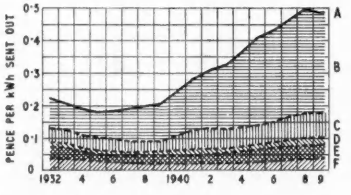
The diagram shows for the half-hour of m.d. of each day (excluding Saturdays and Sundays) maximum output capacity of plant installed and available and the demand actually met. For those days on which the whole demand could not be met the computed amount of load shed is shown. Difference between plant installed and plant available is accounted for by breakdown, overhaul, unsuitable fuel and other causes.

the electricity supply industry by reason of its large use of low-grade coal. Between the first half of 1939 and the last quarter of 1949 the pithead price per ton to the industry increased by 167 per cent and the delivered charge by 150 per cent.

About 7 million tons of the coal was seaborne and of this 70 per cent was carried in the Authority's fleet of colliers which increased from 21 to 33 during the year, raising the aggregate coal-carrying capacity to 70,500 tons.

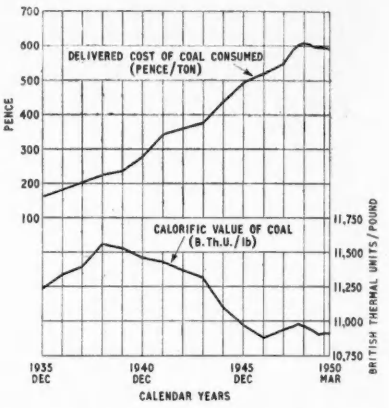
At 31st March last the national grid comprised 5,424 route-miles of main transmission lines and cables (3,753 miles at 132 kV ; the rest at 66 kV or less) a net increase of 121 miles. During the year work put in hand included 292 route miles of 132 kV lines and cables. There were 367 substations with an aggregate transformer capacity of 15,381 MVA—an increase of 866 MVA. The value of main transmission contracts approved during the year was £10·1 million (against £5·75 million in 1948–49).

Extensive reinforcement is required and in its planning there is close co-operation with the Area Boards. The schemes agreed during the year included provision for twenty new supply points to Boards and it is estimated that a capital saving of about £1½ million was made in comparison with the arrangements which would have been made under pre-vesting conditions. A detailed programme was being prepared for the construction of those stages of the projected 275 kV system necessary to meet requirements up to 1960, and the immediate reinforcements of the 132 kV system which will subsequently form part of the 275 kV system will be designed and constructed for the higher voltage. Experimental work on 275 kV equipment continued at the B.E.A. Laboratories. Other problems of design and development received much attention in order to obtain improved and more economical transmission.



Average works cost of production at steam stations (figures for middle of period)

A. Total works cost at steam stations. B. Cost of fuel, excluding transport. C. Freightage. D. Fuel handling. E. Repairs, maintenance, oil, water and stores. F. Operation (salaries and wages).



Price and calorific value of coal at steam stations

Reference is made to the setting-up of the Electricity Supply Research Council, under the chairmanship of Sir Harold Hartley, and the close relationships maintained with specialist research associations, particularly the Electrical Research Association. At the British Electricity Laboratories work was proceeding in a number of directions, including research on fuel, combustion, heat transference, water, steam and flue gases ; conductors, insulators, switchgear, transformers and protective gear ; generating plant, stability and power regulation.

Attention is paid in the report to the 250/300 kV experimental line at Leatherhead ; the work at Croydon on the performance of insulators under humid and polluted atmospheric conditions ; development of methods of reducing cooling-tower precipitation ; arrangements for co-ordinating records of lightning effects on supply systems ; and investigation of interference with telecommunications. Utilization research included load-analysing tests on domestic consumers' installations ; investigation of the cooking load ; a study of the effect of the use of prepayment meters on consumption and the economics of different methods of collection ; and comparisons of costs of providing electricity to pre-war and post-war houses.

An account is given of the methods of charge adopted for bulk supplies to the

Area Boards and it is mentioned that the system of discounts and surcharges ends on 1st April next when the new tariff comes into force.

There were no general changes in consumers' tariffs but three Boards reduced charges in certain domestic tariffs and there were minor adjustments in certain other cases. A reference to the "Clow" surcharge and rebate mentions the statement by the Minister of Fuel and Power that the Boards would not be asked to continue the surcharge in the winter of 1949–50.

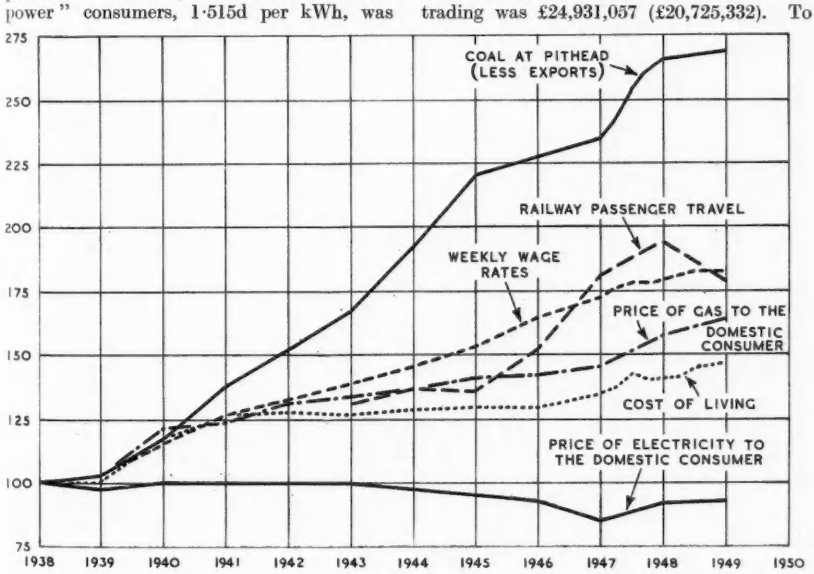
Output and Sales

Generation of electricity in 1949–50 reached a new record (over 49,000 million kWh), exceeding the previous year's figure by 6·3 per cent and doubling that of 1938–39. The number of consumers rose by 452,000 to 12,634,000.

Sales to consumers totalled 41,479 million kWh, and an accompanying graph and Table I show how this was divided between the various classes. The average overall selling price was 1·2d per kWh—2·2 per cent above the preceding year's figure and 14·3 per cent above that for 1938–39. The average price to "domestic, commercial and small power" consumers, 1·515d per kWh, was actually 5·1 per cent below the pre-war average. The average revenue from power sales was 0·925d per kWh (against 0·930d in 1948–49).

The consolidated accounts of the B.E.A. and Area Boards show a total revenue of £213,669,028 (compared with £197,152,368 for 1948–49), made up as follows:—Sales of electricity, £207,347,707 (£191,092,587); sales of steam, £355,669 (£340,566); rentals of meters, apparatus, etc., £3,868,458 (£3,788,345); public lighting maintenance, £1,292,941 (£995,900); surplus on contracting and sales of fittings, £804,253 (£934,970). Against this was charged a total of £188,737,971 (£176,427,036) comprising works costs (generation), £93,736,529 (£89,910,655); purchase of electricity, £1,209,979 (£1,406,674); operation, repairs and maintenance, main transmission, £1,337,069 (£1,112,107); distribution £20,363,211 (£18,857,279); rents, insurances, etc., £1,514,920 (£1,292,619); payments in lieu of rates, £11,819,826 (£12,072,000); administration and general expenses, £24,758,085 (£20,826,762); changes of systems of supply (consumers' apparatus), £374,329 (£341,836); and depreciation of fixed assets, £33,624,023 (£30,607,104).

Thus the consolidated net revenue from trading was £24,931,057 (£20,725,332). To



Comparison of the price of electricity with other prices, costs, etc. (1938 = 100)

TABLE II.—AREA BOARDS' REVENUE AND EXPENDITURE

Board	Total Income		Total Expenditure		Net Surplus or Deficit	
	1948–49	1949–50	1948–49	1949–50	1948–49	1949–50
	£	£	£	£	£	£
London	28,834,759	30,735,776	27,690,015	28,834,686	1,144,724	1,901,090
South Eastern	13,123,892	13,972,183	12,952,140	13,549,560	171,752	422,623
Southern	14,772,543	16,190,054	14,390,162	15,269,831	382,381	920,223
South Western	7,048,478	7,605,638	7,154,965	7,604,854	−106,487	784
Eastern	18,743,588	20,617,972	19,098,837	20,183,789	−355,249	434,183
East Midlands	14,361,671	15,618,959	13,613,623	14,746,420	748,048	872,539
Midlands	18,566,180	20,029,776	17,937,939	19,332,394	628,241	697,382
South Wales	8,833,517	9,556,665	8,515,592	9,105,614	317,925	451,051
Merseyside & N. Wales	11,487,277	12,593,405	11,346,591	12,234,060	140,686	359,345
Yorkshire	17,344,687	19,022,748	16,858,064	17,692,061	486,623	1,330,687
North Eastern	11,026,556	12,165,758	10,766,942	11,636,986	259,614	528,772
North Western	20,726,152	22,169,312	20,333,071	21,551,773	393,081	617,539
S.E. Scotland	4,116,071	4,597,367	3,707,183	4,130,428	408,888	466,939
S.W. Scotland	9,696,727	10,231,204	9,318,121	10,077,352	378,606	153,852
Totals (excluding inter-Board bulk supplies)	195,213,714	211,776,036	190,214,881	202,619,027	4,998,833	9,157,009

this was added £67,633 (£43,046) income from subsidiary companies and £722,589 (£600,436) rents receivable and other miscellaneous income making £25,271,279 (£21,368,814). The deduction of £18,558,043 (£16,977,130), mainly interest, left a consolidated net surplus of £7,163,236 (£4,391,684). No income tax or profits tax was payable. A net balance of £25,773 was transferred from the central reserve fund (against a balance of £1,196,851 transferred to the fund in 1948–49); a sum of £4,600,000 was transferred to Area reserve funds (£2,150,000 in 1948–49) and a balance of £2,589,009 (£1,044,833) is carried forward.

Capital liabilities are shown in the consolidated balance sheet at £608,495,815 (against £622,504,298), the reduction being due to a fall in obligations to local authorities in respect of loans raised by them for the purposes of transferred undertakings. The amount of British Electricity Stock outstanding at 31st March last was £441,625,207 (against £433,051,539). Reserves are shown at £11,554,920 (£4,391,684) and current liabilities and provisions at £131,183,016 (£66,731,348).

On the credit side fixed assets are given as £548,011,693 (£467,768,902); interests in subsidiary companies (less net realized profits) as £1,158,702 (£1,813,148) and current assets as £105,154,279 (£116,091,944).

The revenue account of the British Electricity Authority itself shows a total income from the sale of electricity and steam of £128,098,828 (£121,832,424). There was a net deficit for the year of £1,993,773 (£607,149) which is again met from the central reserve fund.

In 1949–50 all of the Area Boards came out on the right side as will be seen from Table II. In the preceding year the South Western and Eastern Boards incurred net deficits. The most prominent increase in net

TABLE III.—ELECTRICAL CONTRACTING AND SALES OF FITTINGS

Board	Sales		Direct Costs		Gross Profit		Indirect Costs		Surplus	
	1948–49	1949–50	1948–49	1949–50	1948–49	1949–50	1948–49	1949–50	1948–49	1949–50
	£	£	£	£	£	£	£	£	£	£
London ..	1,609,946	1,874,617	1,314,284	1,525,325	295,662	349,292	194,894	285,056	100,768	64,236
South Eastern	1,262,897	1,535,700	1,003,492	1,231,064	259,405	304,636	178,791	285,481	80,614	19,155
Southern ..	1,822,571	2,254,203	1,480,794	1,823,086	341,777	431,117	223,735	357,371	118,042	73,746
South Western	952,437	1,213,817	761,551	927,216	190,886	286,601	118,673	276,915	72,213	9,686
Eastern ..	2,899,563	3,856,970	2,286,841	3,139,398	612,722	717,572	507,784	587,791	104,938	129,781
East Midlands	1,131,289	1,442,644	918,752	1,166,572	212,537	276,072	156,763	178,032	55,774	98,040
Midlands ..	1,407,094	1,962,711	1,162,400	1,562,047	244,694	400,664	134,425	314,025	110,269	56,639
South Wales ..	555,559	753,689	477,549	619,718	78,010	133,971	67,209	101,445	10,801	32,526
Merseyside & N. Wales ..	787,199	920,501	667,175	733,690	120,024	186,811	113,570	176,625	6,454	10,186
Yorkshire ..	1,076,809	1,609,243	907,820	1,359,269	168,989	249,977	94,101	151,142	74,888	98,835
North Eastern	716,126	769,958	605,176	616,092	110,950	153,866	38,980	71,694	71,970	82,172
North Western	1,546,087	1,840,640	1,239,906	1,522,545	246,181	318,097	170,440	240,764	75,741	77,333
S.E. Scotland	208,616	384,718	166,976	297,941	41,640	86,777	57,744	58,325	3,896	28,454
S.W. Scotland	284,968	314,921	228,540	265,452	56,428	49,469	7,826	26,005	48,602	23,464
Totals ..	16,261,161	20,734,335	13,281,256	16,789,413	2,979,905	3,944,922	2,044,935	3,140,669	934,970	804,253

surplus occurred in the case of the Yorkshire Board—from £486,623 to £1,330,678. Only in one instance, that of the South West Scotland Board, was there a decline in net surplus.

Electrical contracting and the sale of "fittings" by the Boards reached a total value of £20,734,335 (against £16,261,161 in 1948–49); there was a net surplus of £804,253, as compared with £934,970 in the preceding year. Table III gives particulars of these activities for the fourteen Boards. The general percentage net surplus was 3·9 but the figures for the individual Boards varied from 0·8 per cent (South Western) to 10·7 per cent (North Eastern). The greatest volume of business was done by the Eastern Board which had a surplus of 3·4 per cent.

Mention is made of the relationships of the Authority and Boards with the Electrical Fair Trading Council and of discussions of arrangements for recognizing the special position of the Boards. The general policy of the Boards in the matter of hire-purchase and credit sales of equipment was co-ordinated. These facilities now almost wholly replace pre-war hire methods.

An Organizing Committee set up to arrange for the establishment of a National Inspection Council for Electrical Installation Contracting appointed a "working party" to prepare a minimum code of wiring practice based on the I.E.E. Regulations. The object is to secure a uniform minimum standard of wiring practice throughout the country.

In the section dealing with employment and staff relations the "machinery" for settling wages and conditions of the various grades is described and decisions arrived at during the year are reported. Attention is also given to the schemes for joint consultation. Provisions relating to safety, health and welfare and education and training are referred to at some length.

As we stated at the beginning of this review, we have been able to give only a selective and general idea of the contents of the Report. There is a mass of interesting detail on all aspects of the industry. The Report comprises 260 pages, including complete financial statements, 46 appendices, some of which are graphs, and an index. It is published by H.M. Stationery Office at 5s 6d.

New Domestic Tariff

DETAILS have been published by the South Wales Electricity Board of a new domestic tariff which is to replace existing tariffs in West Wales in the New Year. This is the first step towards the promotion of a measure of standardization of charges throughout South Wales. Lighting flat rates for domestic purposes will no longer be available.

The new tariff will comprise a primary charge of 4½d per kWh for an initial number of kWh supplied each quarter, and a secondary charge of ¾d per kWh. The primary consumption will be calculated by reference to the number of rooms as follows: Not more than two rooms, 20 kWh; not more than ten rooms, 10 kWh per room; over ten rooms, 100 kWh with an additional 5 kWh for each room in excess of ten There is to be no minimum or standing charge and meter rentals for supplies for domestic purposes will be discontinued. Quarterly credit consumers will be offered a discount of 2½ per cent for payment of accounts within 21 days. In view of the costs incidental to the use of prepayment meters the Board originally intended to continue the general principle of requiring a higher charge under the tariff for prepayment supplies, but representations against any differential charge were made by the Consultative Council and the Board, after a careful review, decided that for the present there should be no extra charge. With all other matters appertaining to the proposals the Consultative Council expressed concurrence.

The new charges apply only to a specified list of localities and will not come into force until after the first meter readings in 1951. As an interim measure flat rates other than domestic are being reduced to 6d where they are in excess of that figure.

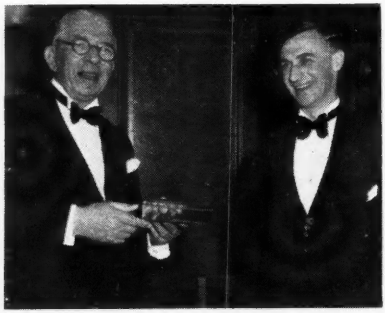
Cost of Traction Supplies

THE report of the Newcastle-on-Tyne City Council's transport undertaking, which includes trolley-buses and motor-buses, shows that there was a profit of £83,512 compared with a loss in the previous year of £52,579. The general manager (Mr. F. S. Taylor) recommends that the reserve fund standing at £255,830 should be increased to £350,000 as a cushion against fluctuating conditions. The report states that power costs for electric traction are still rising. This is a serious source of concern to municipal operators and a special committee has been set up to go into the question of tariffs with the B.E.A.

PERSONAL and SOCIAL

News of Men and Women of the Industry

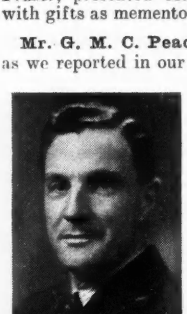
LAST week **Mr. D. G. Sutherland,** B.Sc., M.I.E.E., left this country for South Africa to take up the position of general manager of Scottish Cables (South Africa), Ltd. For the past five and a half years Mr. Sutherland has been sales manager of Scottish



Mr. W. Fraser making the presentation to Mr. D. G. Sutherland

Cables, Ltd., Renfrew, and before leaving he and Mrs. Sutherland were entertained to dinner by the directors. Many members of the staff with their ladies were present and, during the evening, the governing chairman, Mr. W. Fraser, presented Mr. and Mrs. Sutherland with gifts as mementos of the occasion.

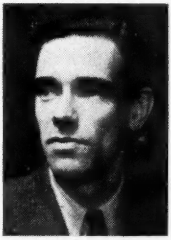
Mr. G. M. C. Peacock, A.M.I.E.E., who, as we reported in our last issue, is to succeed Mr. J. O. Twinberrow on 1st January next as manager of the Publicity Department of Babcock & Wilcox, Ltd., was born in Auckland, New Zealand, in 1905 and was educated at Auckland University College (University of New Zealand). He received his training with the Auckland Electric Power Board and later in England with the Metropolitan-Vickers Electrical Co., Ltd. In 1933 he was appointed publicity engineer to the Hackbridge Electric Construction Co., Ltd., becoming manager of the Progress Department of the company in 1937, and manager of the Publicity Department of the Hackbridge & Hewittic Electric Co., Ltd., earlier this year.



Mr. G. M. C. Peacock

Mr. G. R. Thursfield, who has been associated with the Sturtevant Engineering Co., Ltd., for fifty-two years, has intimated his wish to resign from the position of managing director as from 31st December. He will continue as chairman. **Mr. W. E. N. Gwilt,** who has been with the company for over forty years, and has been a director for the last nine years, will succeed Mr. Thursfield as managing director.

Mr. D. W. M. Allen has been appointed a director of W. H. Allen, Sons & Co., Ltd., Bedford. Mr. Allen is the only son of the late Mr. M. Allen and grandson of Sir Richard W. Allen, C.B.E., D.L., the company's present chairman, and great-grandson of the late Mr. W. H. Allen, the founder and first chairman of the business. He was educated at Canford School and Trinity College, Cambridge, and received his engineering training at the company's Queen's Engineering Works, subsequently serving as an engineer officer in the Navy during the last war. Mr. Denis Allen rejoined the company in September, 1946, since when he has been responsible for the work of the Installation and Service Departments.



Mr. D. W. M. Allen

Mr. D. Lacy-Hulbert, B.Sc., A.R.I.C., M.Inst.F., has been appointed joint managing director (technical) of the Chesterfield Tube Co., Ltd., a subsidiary of Tube Investments, Ltd.

Mr. J. B. Moffat is leaving for South Africa on the *Clan Shaw* on 2nd December to represent Erskine, Heap & Co., Ltd., on the technical sales staff of their agents for South Africa and Rhodesia, Hubert Davies & Co., Ltd. Mr. Moffat received his technical education at the Glasgow Royal Technical College, followed by

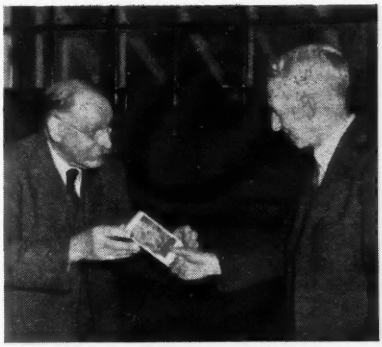
an apprenticeship with Harland & Wolff, Ltd. After spending a period with the Brush Co. at Loughborough, he joined his present company early in 1949.

At the annual meeting of the Royal Society on 30th November, **Prof. E. D. Adrian**, O.M., was elected president of the Society.

Mr. C. H. Bailey, manager of the Illuminating Glassware Department of Falk, Stadelmann & Co., Ltd, is relinquishing this position at the end of March next year but his services will be retained in a consultative capacity. Mr. Bailey has been with the company for sixty years, joining it in 1890 as a junior clerk. He was appointed manager of the Illuminating Glassware Department in 1896.

Mr. C. H. Bailey

A conference of works executives and district office engineers (home areas) took place in the bowls pavilion at the Bushbury Engineering Works of the **Electric Construction Co., Ltd.**, on 23rd and 24th November. The assistant managing director, Mr. W. M. B. Furniss, presided, and was supported by Mr. W. Tonkinson, director and chief engineer, Mr. E. W. Walker, director and Birmingham area representative, and Mr. J. Johnson Smith, director and London area manager. All home district offices were represented and the various departments of the works sent executives to deal with points raised by the district engineers. The opportunity was taken to make a presentation to Mr. H. Patten, sales manager, to mark the occasion of the completion of fifty years' service with the company. The presentation took the form of a wallet of notes subscribed for by the directors, executive staff, and district engineers, and was made by Mr. W. M. Furniss, chairman and managing director.



Mr. W. M. Furniss (chairman and managing director of E.C.C., Ltd.) making a presentation to Mr. H. Patten (sales manager) on completion of fifty years with the company

The staff annual dinner was held on 24th November at the Wulfrun Hall, Wolverhampton. The toast of the E.C.C. and its chairman was proposed by Mr. W. J. Stay, deputy chief engineer, Mr. W. M. B. Furniss, assistant managing director, responding.

Mr. M. Seaman, M.Sc., M.I.Mech.E., M.I.Prod.E., A.M.I.E.E., has been appointed general manager of the engineering works of the British Oxygen Co., Ltd., Edmonton. He has relinquished his appointment as director and general manager of David **Brown-Jackson, Ltd.**, Manchester, and will take over control of the Edmonton Works on 1st January next.

The annual dinner-dance of the Nottingham branch of the **Electrical Industries Benevolent Association** was held on

At the Nottingham E.I.B.A. dinner-dance (left to right): Mrs. Bond, Mr. T. C. Bond (Furse Wholesale, Ltd.; chairman of the Branch), Mr. C. R. King (chairman, East Midlands Electricity Board), Mrs. King and Mr. M. Wadeson (manager, No. 6 Sub-Area, E.M.E.B.)

4th November at the Victoria Hotel, Nottingham. Strong local support was given to the function, which was attended by many well-known electrical personalities in the area. The accompanying photograph was taken during the evening.

Mr. J. Taffs, who retired from the position of publicity manager of the English Electric Co., Ltd., at the end of June last, was presented with an English Electric television receiver at a ceremony at Queen's House, Kingsway, on 22nd November. The presentation was made by Mr. E. B. Banks, commercial manager of the company, in the presence of a large number of senior officials.

At a special meeting of the Institution of Mechanical Engineers on 15th December the Council is to recommend that **Mr. Brian G. Robbins,** M.Sc.(Eng.), be appointed secretary of the Institution as from 1st January next.

The annual dinner and dance of the **Association of Electrical Machinery Trades,** was held on Friday last at the Savoy Hotel, London, and was presided over by Mr. R. H. Gill, the chairman of the Association. Speeches at this function, are, by custom, of the briefest, and in proposing the toast of the guests, Mr. Gill followed tradition. He did, however, refer to the co-operation which existed between the Association and the B.E.A.M.A. and said that members of the A.E.M.T. were competent men who had succeeded in gaining the confidence of buyers who sought equipment of quality. He paid tribute to the work which Mr. W. E. Lawton, the president, had done on behalf of the Association. The Hon. James R. Rea (secretary of B.E.A.M.A.), who responded, spoke of the formation of the A.E.M.T. in 1944 to dispose of surplus war stocks of electrical machinery, and said that it had grown into a vigorous and very necessary part of the electrical industry. Mr. Lawton made an appeal for the E.I.B.A. and from a number of prizes distributed during the evening that worthy cause will benefit by over £50. An excellent cabaret was given and the company was so loath to leave that dancing was extended beyond the scheduled hour of midnight.

The fiftieth anniversary of the incorporation of the **Electrical Trades Supply, Ltd.,** Birmingham, as a limited company was celebrated recently when a dinner and dance was held in Birmingham. The chairman of the Midlands Electricity Board, Ald. W. Lewis, proposing the toast of the "E.T.S," stressed the services that wholesalers had given during the last fifty years and were still giving, to contractors, works, and to the Area Electricity Boards and said the wholesalers must still remain the main distributors of manufacturers' products in the industry in the future. In supporting the toast Mr. J. M. Hollander dwelt on the need for wider recognition of the service rendered by the wholesale distributor to the electrical industry. Mr. E. Vaughan (managing director) responded to the toast.

About 100 attended the third annual dinner of the Foremen's Section of the Staff Association of the **Telegraph Construction & Maintenance Co., Ltd.,** which was held on 29th November at Pyne's Restaurant, Lewisham Way, London. Mr. C. Wilmot, chairman of the Foremen's Section, proposed a toast to the Company. He said that 1950 was a memorable year for Telcon which celebrated its centenary last August. The only sad note in a momentous year was the passing of the former managing director, Sir Geoffrey Clarke. Mr. J. N. Dean, managing director, replied for the company. Mr. C. Douglas, assistant secretary of the Section, gave the toast to the guests and Lt.-Col. R. W. C. Reeves (director of Johnson & Phillips, Ltd.), responded. Dr. G. A. V. Sowter, manager of the Metals Division, proposed the toast to the Foremen's Section and Mr. W. R. Bell, secretary, replied. Among those present were Mr. W. Glass, Mr. B. H. Musgrave (directors of Telcon), Dr. E. W. Smith (director of Submarine Cables, Ltd.) and the works manager, Mr. F. Leighton.

The Telcon Social and Athletic Amateur Boxing Club (Telegraph Construction & Maintenance Co., Ltd.), sponsored another successful inter-club tournament with the Aylesford A.B.C. on 22nd November in the canteen at the company's Greenwich works.

The Amateur Dramatic Section of the Victoria Works Athletic Club (**Johnson & Phillips, Ltd.**) presented "See How They Run," by Philip King, on 17th and 18th November. The play was produced by Mr. W. E. Pryer. Among the audience were Mr. G. Leslie Wates, J.P., chairman of the company, and Mr. W. Glass, joint managing director.

The host of this year's presentation ball of the London Business Houses Amateur Sports Association, held at Wembley Town Hall on 30th November, was the Athletic Section of the **British Thomson-Houston Co., Ltd.,** Willesden. Well over 600 people spent an enjoyable evening, during which Mrs. H. E. Cox presented the trophies and medals. Lensbury being awarded the aggregate cup. Among the many guests were the Mayor and Mayoress of Wembley.

A scheme of long service awards has been introduced by **Johnson, Matthey & Co., Ltd.,** and the first presentation ceremony was held on 30th November in the company's staff restaurant, Hatton Garden, London, when Mr. H. W. P. Matthey (chairman), presented sums ranging from £15 to £40 to members of the staff and works who had completed twenty

to thirty years' service, and gold watches to those with forty years' service or more.

With reference to our last week's note on the appointment of Mr. R. Speirs as London director of Dorman & Smith, Ltd., the company informs us that **Major R. Amberton** remains on the boards of all the companies of the group.

OBITUARY

Mr. Edwin Henry Dixon, B.Sc., M.I.E.E., who was Head of the Electrical Engineering and Physics Department of the Royal Technical College, Salford, from 1914 to 1937, when he retired on superannuation, died at his home at " Homelands," Sussex Avenue, Ross-on-Wye, on 27th November. Before his appointment at Salford he was a lecturer at the University College, Southampton. Mr. Dixon was seventy-three years of age.

Mr. John Bentham, who died recently at Wakefield at the age of seventy-five, was responsible, as consulting electrical engineer, for the development of the use of electricity in collieries. He was a pioneer in the introduction of electrically driven coal cutters and designed some of the first flameproof switchgear and earth leakage protection devices.

Mr. Percy Good, C.B.E., M.I.E.E., F.C.G.I., director of the British Standards Institution, died on Saturday at the age of seventy. Mr. Good was educated at the City of London School and the City and Guilds College, serving his time with the Thames Ironworks. He then undertook consulting and research work for industrial organizations and became superintendent of the Testing Department at Faraday House. His association with the B.S.I. (then the British Engineering Standards Association) commenced in 1913 when he became electrical secretary of the Association. He was appointed deputy director in 1929 and director in 1939. Included in his many activities for the B.S.I. was his work in connection with the British Commonwealth Standards Conference in 1946 and with the Anglo-American agreement on screw threads.

The late Mr. Percy Good

Mr. Good was especially interested in matters relating to illumination and was largly responsible for the floodlighting arrangements during the International Illumination Congress held in this country in 1931. He was elected president of the Illuminating Engineering Society in 1938. At the outbreak of war he became chairman of the Joint Lighting Committee of the Ministry of Home Security and the Illuminating Engineering Society and in 1941 he was awarded the C.B.E. for his services. He was a member of the committee appointed by the President of the Board of Trade last May to inquire into the supply position of utility cotton goods and he was also one of the trustees of the Basic English Foundation. Mr. Good was President of the I.E.E. in 1947-8 and he was an honorary Fellow of the Imperial College of Science and Technology.

WILLS

Mr. G. P. Chace, manager of the London office of the British Vacuum Cleaner and Engineering Co., Ltd., who died on 2nd September last, left £4,952 gross (£3,526 net).

Mr. A. Lindsay, M.I.E.E., principal of Alexander Lindsay, Ltd., electrical engineers and contractors, a former chairman of the Scottish Centre of the Institution of Electrical Engineers, who died on 28th June last, left estate in England and Scotland valued at £19,050.

TRADE MARKS

APPLICATIONS have been made for the registion of the following trade marks. Objections may be entered within a month from 29th November.

BENDIX. No. 681,194, Class 6. Domestic washing machines and parts thereof included in Class 7.—Bendix Home Appliances, Ltd., 99a, Park Lane, London, W.1.

" ROTANEON." No. B688,520, Class 9. Neon electric advertising signs.—S. Trup & Co., Ltd., 42, Whadcoat Street, Finsbury Park, London, N.4.

MELPLAS. No. 688,875, Class 9. Insulated cables.—Melwood Thermoplastics, Ltd., Willoughby Road, Harpenden.

NEOGRAM. No. B690,156, Class 9. Electrically illuminated signs, electric signalling and communication apparatus.—P. C. Berend, Garth House, Ham Common, Richmond, Surrey.

THE CENTURION (design). No. 691,109, Class 9. Electric vacuum cleaning apparatus and domestic floor polishers.—Bylock Electric, Ltd., 109, South Street, Ponders End, Middlesex.

WESTAR. No. 687,983, Class 10. Electrical instruments and apparatus for aiding the deaf.—Western Electric Co., Ltd., Liberty House, Regent Street, London, W.1.

HOTPOINT. B687,761, Class 11. Electrical appliances included in Class 11 for lighting, heating, cooking, refrigerating, cooling, freezing, drying, ventilating and air conditioning.—Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.

" ARISTOCRAFT " (design). No. 689,199, Class 11. Food trolleys and conveyors, all fitted with electrical heating elements.—G. R. Carter, trading as Metal Commodity Co., 25, Sutherland Avenue, Cuffley, Herts.

ELBRIC. No. 690,988, Class 11. Electric torches.—Société des Accumulateurs Elbric Société Anonyme, Rue Saint Pierre 3, Lausanne, Switzerland. Address for service : c/o Frank B. Dehn & Co., 103, Kingsway, London, W.C.2.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Fluorescent-Tungsten Lighting

YOUR correspondent "Sigma" is naturally interested in the economics of fluorescent-tungsten lighting development recently announced. He should, however, bear in mind that the economics of fluorescent versus tungsten lighting vary with the cost of electricity and the burning hours per annum, and may show little if any advantage in cost per lumen-hour at 1d/kWh. Nevertheless, the advantages of fluorescent lighting (colour, low brightness and extended light source) are such that its introduction for industrial and commercial purposes represents one of the greatest advances in lighting.

To make a more practical comparison your correspondent should make his calculations with electricity flat rates of 2d, 3d and 4d/kWh. Even after allowing for the cost of chokes and capacitors spread over a number of years, fluorescent lighting with chokes and capacitors will be found to show substantial advantages over tungsten lighting at these rates.

The new fluorescent tungsten lighting circuit does not claim to be as efficient as the fluorescent lamp with choke and capacitor, but it does claim to be more efficient than the tungsten filament lamp and avoids capital expenditure on chokes and capacitors. In other words, without the capital expenditure involved for chokes and capacitors, the fluorescent tungsten circuit provides the lighting advantages of the ordinary fluorescent lighting circuits and does so at an overall saving on tungsten lighting at flat rates for electricity somewhat above 1d/kWh.

E. B. SAWYER,
Manager,
Lighting Service Bureau.

London.

E.D.A.'s Publicity

AS an advertising man, I cannot agree with "Reflector" that E.D.A., or any other organization, should not publicize particular domestic appliances. Chosen as typical, a proprietary product designed for a competitive market is better for publicity purposes than a "composite" article of the artist's imagination. Either customers would demand such a "delightful" product or would go over to gas because they dislike "that monstrosity which the showrooms don't stock anyway."

I know "Reflector" does not suggest unfair discrimination by E.D.A., but E.D.A. exhibitions would not perform their desired functions if typical appliances were withdrawn and methods only featured.

Manufacturers have, of course, similar difficulties, for the illustration of a specific model usually results in heavy demands at the expense of others in the range but, were a "composite" model illustrated instead, the result would be disastrous.

In practice, so far as E.D.A. publicity is concerned, the showroom assistant will usually have the opportunity of demonstrating all models to the consumer whose interest was aroused initially by the advertisement of a specific proprietary article.

G. A. T. BURDETT, A.M.I.I.A., M.I.A.M.A.
Stamford, Lincs.

Unearthed Appliances

RECENTLY I was tempted to buy a certain type of electrical trouser presser which, when I tried it out, gave me a fairly severe shock. When remarking upon this to the salesman, he blandly assured me that this was the case with all these types of trouser pressers which are not earthed.

Unless, however, this was a faulty sample, I would say that such an appliance is fatally dangerous unless used in an earth-free situation, which may not always be the case.

Bristol, 8. A. KESSLER.

[This would seem to be a case for submission to the E.D.A. Test House, 2, Savoy Hill, London, W.C.2, for discussion with the makers concerned.—EDS.]

Coal for Poole

The B.E.A. collier *Poole Harbour* berthed at the power station wharf at Poole last week with the first cargo of coal for the new station.

PARLIAMENTARY NEWS

From Our Special Reporter

IN the House of Lords last week Lord Shepherd referred to a reply which he gave to Lord Swinton on 28th November in which he said that the British Electricity Authority was going ahead with its new stations and that it was hoped that after this year electricity cuts would no longer be necessary, though much would depend on the speed at which the stations were completed. He was afraid he went rather further than he should have done and apologized for the error. He now understood that, although it was hoped in succeeding years that electricity cuts would occur with decreasing frequency, in view of the steadily rising demand, particularly in industry, they must still be expected for several years ahead.

Power in British Guiana

In the House of Commons Mr. Sorensen asked the Secretary of State for the Colonies what financial and other steps had been taken in view of the large production of bauxite in British Guiana and the abundance of water power in that Colony, to secure a hydro-electric survey, in order to ensure the supply of electricity to British Guiana and enable that Colony to manufacture aluminium.

Mr. Dugdale, Minister of State for Colonial Affairs, said that preliminary investigations, such as measuring the flow of water at individual falls and aerial photography, were now being carried out. Some time must elapse before it would be possible to determine the prospects of developing hydro-electric power in British Guiana at the cost and on the scale required for the manufacture of aluminium in competition with existing manufacturers.

Electric Heating

In reply to Mr. Murray, Mr. Bevan (Minister of Health) said that he had not authorized the use of electric cables inserted under the floor for heating houses built by local authorities. He had no information about the use of this method in privately built houses.

Uganda Supplies

Mr. Dodds-Parker asked whether a date and charges for the purchase of electricity from the Owen Falls power station had yet been scheduled.

Mr. Dugdale said it was hoped that the dam would be completed and the first four generator sets installed by 1953. The charges for the supply of electricity had not yet been scheduled.

Mr. Dodds-Parker asked what action was being taken to attract industry to utilize the electricity supply to be obtained from the Owen Falls plant.

Mr. Dugdale replied that discussions had been held, and were continuing, between representatives of the Uganda Government and firms likely to be interested in establishing themselves in Uganda.

Tax on Water Heaters

Captain Ryder asked the Chancellor of the Exchequer if, in view of the need to economize in fuel, he would reduce the purchase tax on gas water heaters and other fuel saving devices.

Mr. Douglas Jay, who replied, said that the suggestion would be borne in mind.

Captain Ryder asked whether it would not be better to carry this out now, before the approach of winter weather, and Mr. Keeling asked if representations had been received on this matter from the Ministry of Fuel and Power.

Mr. Jay said that they had frequently discussed the matter with the Ministry of Fuel and Power; indeed, it was in consultation with them that the various rates in force had been adopted.

Mr. Erroll asked if consideration had been given to grading the tax according to the amount and type of fuel consumed, whether solid or otherwise, rather than by the prime cost of the appliance.

Mr. Jay said it would be remembered that, basically, the present rates were adopted in 1947 mainly to encourage fuel saving devices.

Electric Washing Machines

AT the invitation of the Bournemouth Branch of the Association of Supervising Electrical Engineers, Mr. G. A. Williams, head of Home Laundry Engineering, the Hotpoint Electric Appliance Co., Ltd., gave a talk, entitled "The History of Electric Washing Machines," at the Grand Hotel, Bournemouth, last week. By courtesy of the A.S.E.E. the meeting was also attended by members of the Southern Electricity Board, the Electrical Contractors' Association and the Electrical Association for Women.

Mr. Williams traced the history of the cleansing of clothes through the stages when mankind first adopted fabrics as a covering and washed them in river water. The lecture was illustrated by numerous lantern slides which showed the ingenious efforts of mankind to eliminate labour from the laundering of clothes.

NEW BOOKS

Wireless Servicing Manual. By W. T. Cocking, M.I.E.E. Eighth edition. 296 pp. (illus.). Published for *Wireless World* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 12s 6d net (postage 5d).

This is an established work on the location and cure of faults in broadcast receivers and their associated equipment. It is also invaluable in solving many of the problems arising in experimental and constructional work.

In the revision of the eighth edition the chapter on television receiver defects has been completely rewritten. Apart from domestic sets, short-wave receivers and convertors are covered, and there is also a special chapter devoted to servicing with the cathode-ray oscilloscope. Methods of ganging receivers of both the "straight" and superhet types are given in detail, and the problems of hum and distortion are treated with the same thoroughness. A useful appendix contains much information of the kind constantly required in everyday servicing work, and there is a very complete index.

Applied Electricity. By Edward Hughes, D.Sc.(Eng.), Ph.D., M.I.E.E. Pp. 412; figs. 269; index. Longmans, Green & Co., Ltd., 6 & 7, Clifford Street, London, W.1. Price 10s 6d.

The words "Applied Electricity" chosen for the title of this book might be taken as covering all the practical applications of electricity in every sphere of human activity. Actually, they are used to indicate that the author has covered the syllabus of the subject "Applied Electricity" in Part I of the B.Sc. (Engineering) examination of the University of London. Thus, it may also claim to cover the third year course for the National Certificate in "Electrical Engineering Science," the intermediate examination in "Electrical Engineering Practice" of the City and Guilds of London Institute and the "Principles of Electricity" in Section A of the Joint Inst.C.E. and I.E.E. examination.

This syllabus, as is generally realized, covers a very wide field and the author, who is himself an experienced teacher, is to be congratulated upon the manner in which he has arranged his chapters so that as far as possible each part of the subject develops from the one preceding it as, for example, when he interrupts his study of alternators to deal with rotating fields. Moreover, as students often find difficulty in using symbolic notation with the j operator, in the chapters on a.c. circuits he is content to use the normal graphical and mathematical methods of vector arithmetic, placing the chapter on symbolic notation at the end of the book while, throughout, he is sparing in the use of the calculus. Worked examples and problems (with answers) are given with each chapter and, when necessary, exact references are made to the author's second year textbook to enable the student to refresh his memory on the fundamentals of the subject under discussion.

This is an excellent book at a very reasonable price and can be recommended to all engineers studying for any of the examinations noted above.—A. R.

Books Received

Radio Laboratory Handbook. By M. G. Scroggie. Fifth edition. Pp. 430 + xxxiv; figs. 216; index. Published for *Wireless World* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 15s.

Voltage Stabilizers. By F. A. Benson, M.Eng., A.M.I.E.E. Pp. 125; figs. 97; index. *Electronic Engineering*, 28, Essex Street, London, W.C.2. Price 12s 6d.

Identification of Molecular Spectra. By R. W. B. Pearse, D.Sc., F.R.A.S., and A. G. Gaydon, D.Sc. Second edition. Pp. 276; 12 plates; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 50s.

Steam Turbines and Their Cycles. By J. K. Salisbury. Pp. 645; figs. and index. Chapman & Hall, Ltd. Price 72s in U.K.

Matrix Analysis of Electric Networks. By P. Le Corbeiller. (Harvard Monographs in Applied Science No. 1.) Pp. 112; figs. 49; index. Chapman & Hall, Ltd. Price 24s.

Antenna Theory and Design. By H. Paul Williams. Vol. 1. Foundations of Antenna Theory. Pp. 142; figs. and index. Price 21s. Vol. 2. The Electrical Design of Antennæ. Pp. 522; figs. and index. Price 63s. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2.

The Nomogram. By H. J. Allcock and J. R. Jones. Revised by J. G. L. Michel. Fourth edition. Pp. 238; figs. 81; index. Sir Isaac Pitman & Sons, Ltd. Price 18s.

Elektrische Niederspannungs-Schaltgerate. Third edition. By Werner Kussy. Pp. 353; figs. 342; index. Verlag-Herbert Cram, Berlin, W.35. Price 38 marks.

Commerce and Industry

Engineering Wages Agreement

Birmingham Waterworks Plant

LAST week an agreement was signed by the Engineering and Allied Employers' National Federation and the Confederation of Shipbuilding and Engineering Unions which settles the differences between the two parties arising out of the Confederation's claim for £1 a week increase in the wages of members of the engineering trade unions. The agreement consolidates the minimum time rate with the existing national bonus and provides for an increase of 11s in the minimum wages for a 44-hour week for skilled workers, raising the rate to 118s; unskilled workers will receive an 8s increase, making 100s a week, and semi-skilled men will get increases varying between the two amounts.

Skilled workers who are at present receiving additional payments which make their earnings 117s 2d or less will receive the full 11s increase; those earning between 117s 2d and 128s 2d will have their wages made up to the latter figure. Similarly, unskilled workers now receiving 98s or less a week will be given the full 8s increase and those getting between 98s and 106s will have their pay made up to 106s. Semi-skilled workers will be similarly dealt with.

Piecework rates are to be adjusted so that workers can earn at least 45 per cent above basic rates, instead of 27½ per cent. The agreement takes effect from the first full pay period following 13th November.

Patents Guide

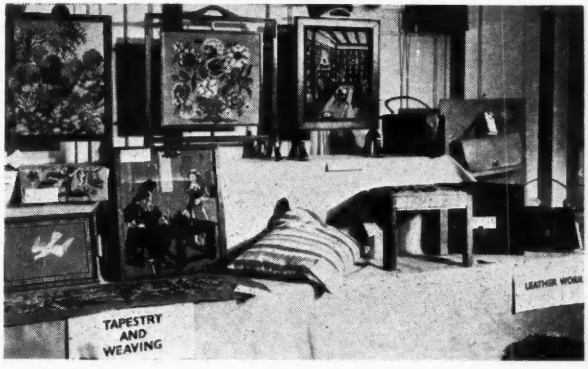
The changes made in the law by the new Patents Act still leave this subject one of great complexity for the lay mind. A guide to the law as it now stands, published by the National Union of Manufacturers, is of considerable value. It has been written for the National Union by Mr. Robert Lochner, an authority on the subject, who traces the whole process of obtaining a patent under the new procedure and then makes clear the obligations and rights which follow when the patent has been granted. Copies can be obtained from the head office of the Union, 6, Holborn Viaduct, London, E.C.2, at 2s 6d, post free.

T.I. Acquires Canadian Interest

Subject to formalities, negotiations have now been completed for the acquisition by Tube Investments, Ltd., of a substantial interest in the Standard Tube Co., Ltd., of Woodstock, Ontario, Canada. The company, which will be renamed the Standard Tube and T.I., Ltd., has been mainly concerned in the manufacture and fabrication of electrically welded precision steel tubes for the Canadian market, and owns a number of distribution depots throughout the country.

Waterworks Hydro-Electric Contract

Gilbert Gilkes & Gordon, Ltd., Kendal, have received the order for two 215 kVA hydro-electric units for installation at the Elan Valley Waterworks of the City of Birmingham Water Department. These will replace the 60 kW "Gilkes" turbines which are now more than forty-five years old, and will utilize to the fullest practical extent the potential power of the compensation water which has to be discharged continuously into the River Elan from the lowest of the Corporation storage reservoirs. Some of the power will be utilized locally for



Some of the exhibits at the recent Arts and Crafts Exhibition of the Eastern Area of the Eastern Electricity Board at the Wood Green Demonstration Hall. (*Electrical Review*, 24th November, page 855)

the requirements of the plant and property owned by the Water Department and the surplus will be fed to the nearest mains of the South Wales Electricity Board's supply area. The alternators and switchgear will be manufactured by the Metropolitan-Vickers Electrical Co., Ltd., Manchester.

Mobile Service Centres

The Yorkshire Electricity Board has recently placed in commission another mobile service centre. This vehicle, built on an Austin twenty-two seater coach chassis, is designed chiefly for use in rural areas and in addition to being a travelling showroom it has facilities for demonstrations and film shows. Payment of accounts can also be made, for which purpose a small panel opens in the side and a platform which is stowed under the body is easily erected. Minor repairs and adjustments to the smaller electrical appliances can also be undertaken. Other vans of this type have made extensive tours of the Area, visiting villages and hamlets, some already supplied with electricity and others included in the Board's rural development plan.

Crop Drying

A survey of the various electrical methods now available for the drying of crops—the use of ventilated bins, in-sack drying, continuous grain drying and barn hay drying—is contained in an illustrated leaflet received from Woods of Colchester, Ltd., relating to the applications of "Aerofoil" fans and duct air heaters.

Cable Tightening Tool

It is announced that Asea Electric, Ltd., has been granted the sole agency in Great Britain and Ireland for the "Linst" cable tightening tool made by the Bofors concern, Sweden. Apart from its obvious uses in overhead line erection, this tool can also be used for pulling up tree stumps and many other similar applications. It is intended for a maximum pull of 2,200lb and can be employed for bracing and tightening where all wires and cables are between 3mm and 9mm in diameter. Other sizes are available for cables of 6–12mm and 8–14mm in diameter. The tool weighs only 7lb and it is 24·5in long by 6·66in wide by 1·33in thick.

"Linst" cable tightening tool in use

Works Visit

Members of the Leicester Electrical Society visited the works of the Midland Electric Manufacturing Co., Ltd., at Tyseley, Birmingham, on 30th November, the tour including an inspection of the company's laboratory.

Electricity at Mothercraft Exhibition

An interesting feature of the recent Mothercraft Exhibition held at the Central Hall, Westminster, was the display of the London Electricity Board. This was in the form of a model kitchen which was constructed entirely by the Board's own Display Department. Instead of giving one large demonstration at stated intervals, a series of small demonstrations of cookers, washboilers, water heaters, drying

The stand of the London Electricity Board at the recent Mothercraft Exhibition held at the Central Hall, Westminster

cabinets, food mixers, etc., was given more or less continuously throughout the day by demonstrators acting on rotas. This method was found to be very successful. A general view of the stand is shown in the accompanying picture.

Forward Orders for Zinc

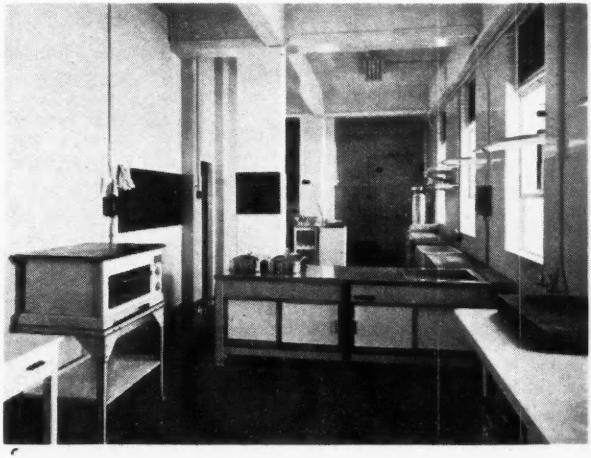
The Ministry of Supply announces that the allocation of virgin zinc in 1951 is being considered, and that, in the meantime, no further orders for zinc for delivery after 31st December next can be accepted by the Director of Non-Ferrous Metals.

Standard Coaches for British Railways

Details of the first British Railways standard passenger coaches now being built are announced. Of both compartment and open type, they will have all-steel bodies and will be 63ft 6in long. Special steps have been taken to secure good lighting. The new kitchen cars will be the largest ever put into service on British railways and will include a kitchen 20ft long, two 12ft pantries, a cold larder, attendants' compartment and attendants' lavatory. Cooking will be by anthracite for joints, etc., and by electricity for grills, toast and so on, and there will be ample refrigerated accommodation. During 1951 it is planned to construct 1,189 of these standard passenger coaches.

All-Electric Kitchen in Nairobi

The Mansion House, Nairobi, Kenya, now includes an all-electric kitchen, for which Jas. Stott & Co. (Engineers), Ltd., of Oldham, have supplied equipment including an electric griller, hotcupboard, café set, and ancillary equipment. The installation was carried out by the company's agents, Naumann, Gepp & Co., Ltd. Some of the equipment installed is shown in the accompanying picture.



All-electric kitchen at the Mansion House, Nairobi

Exchange Control Relaxation

The Treasury announces that in future the Exchange Control form C.D.3 need not be completed for the export of goods not exceeding £10 in value (f.o.b.). This concession is not restricted to post parcels and packets, but extends to exportation by all normal means. Export licensing requirements remain unchanged ; and, unless the goods are being sent by way of gift, the exporter is still under obligation to comply with the requirements of the Exchange Control Act, 1947, concerning methods of payment and surrender of currency. The usual pre-entry documents for goods exported by sea or air freight and the usual Customs declaration form showing the description and value of the goods for postal parcels and packets will still be required.

Tax on Projector Lamps

The Commissioners of Customs and Excise draw attention to the fact that all projector lamps not exceeding 250 W (including those within Classes A1 and G of the Electric Lamp Manufacturers' Association classification) are chargeable with purchase tax under Group 14 (c) of the tax schedule. Notice No. 78, at page 36, should be noted accordingly. An application for an Order to be made exempting these lamps from tax has been submitted to the Treasury.

Fuel Efficiency Exhibition

The North Western Division of the British Electricity Authority recently took part in a Fuel Efficiency Exhibition held under the auspices of the National Smoke Abatement Society. The Division used as the theme "More Power — Efficient Combustion — Less Smoke," and quoted passages from a broadcast

talk by Dr. J. Bronowski in which he stated that power stations were the cleanest burners of coal. This point were emphasized by demonstration of an electrostatic precipitator model, lent by Simon Carves, Ltd., and operated by their representatives. Other models on the stand included a pulverized fuel fired boiler and a model of a power station. Photographs showing power stations under construction were also displayed and the divisional chemist explained coal analysis and testing with the various instruments. Suitable films were also shown.

Trade Announcements

A new branch office has been opened by the **Skefko Ball Bearing Co., Ltd.**, at 28, Magdalen Street, Exeter (telephone : Exeter 4353). The branch is in the charge of Mr. E. A. Phillips, under the control of the company's district manager, Mr. E. Y. Caswell.

Elexcel, Ltd., is now represented in the South Wales area by Mr. C. Jones, operating from 24, Tydfil Place, Roath Park, Cardiff (telephone : Cardiff 1533). Previously Mr. Jones was Cardiff area sales manager for Callender's Cable Construction Co. and recently South Wales manager for the Simplex Electric Co.

Metway Electrical Industries, Ltd., King Street, Brighton, have been authorized by the Truvox Engineering Co., Ltd., to supply replacement bars for "Tru-glow" electric fires (No. DF11AB).

F. V. Williams & Co., formerly of 307, Borough High Street, S.E.1, have removed to Prairie Street, Queenstown Road, London, S.W.8 (telephone : Macaulay 1148).

Aircraft Electricians' Strike

Considerable dislocation of British Overseas Airways Corporation services has been caused by a strike of electricians at the London Airport. The dispute arose out of the refusal of two electricians to join the Electrical Trades Union.

Public Transport Conference

The 1951 Conference of the Public Transport Association will be held at Bournemouth from 1st to 3rd May. The Conference headquarters will be at the Royal Bath Hotel, and all the business sessions and other functions will be held in the Pavilion.

Interference Suppression

In an effort to improve the reception of the television programmes all new and used cars and petrol-engined commercial vehicles delivered by City Motors and its branches, Great Western Motors, Reading, and Layton's Garage, Bicester, will be supplied and fitted with an ignition suppressor free, thus anticipating compulsion or concerted action from the industry. This supplements the company's offer to fit without charge suppressors bought by motorists at its branches. To identify cars so fitted they will be delivered with a distinctive label on the windscreen.

Gauge and Tool Exhibition

The third Gauge and Tool Exhibition to be organized by the Gauge and Tool Makers' Association will be held in the New Hall of the Royal Horticultural Society, Elverton Street, Vincent Square, London, S.W.1, from 15th to 25th May next.

Catalogues and Lists

Austin Walters & Son, Ltd., Ayres Road, Manchester, 16.—Priced folder on electric sign flashing equipment.

Philament Electric, Ltd., 12, Westminster Bridge Road, London, S.E.1.—Priced and illustrated catalogue of lighting fittings.

Londex, Ltd., Anerley Works, 207, Anerley Road, London, S.E.26.—Five technical leaflets on relays for miscellaneous specialized purposes.

C. W. Denny, 8, Beaumont Court, Sutton Lane, Chiswick, London, W.4.—Illustrated leaflet on a three-colour battery operated hand lamp.

Beeantee Illuminations (London), Ltd., 69, Upper Street, Islington, London, N.1.—Catalogue of festoon striplighting lampholders and floodlights.

Elkay Electrical Manufacturing Co., Ltd., 42, Woburn Place, London, W.C.1.—Priced leaflet illustrating electric display turntables for shops and showrooms.

W. T. Henley's Telegraph Works Co., Ltd., 51-53, Hatton Garden, London, E.C.1.—Illustrated brochure describing the company's entire range of products.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £120 0s 0d
COPPER, H.C. Electro	ton £202 0s 0d
Fire Refined 99·7 per cent ..	ton £201 0s 0d
Fire Refined 99·2 per cent ..	ton £200 10s 0d
LEAD, English	ton £137 0s 0d
MERCURY	flask £31 15s 0d
TIN	ton £1,035 0s 0d
ZINC, G.O.B. Foreign	ton £151 0s 0d
Electrolytic	ton £155 0s 0d
BRASS Tubes	lb 1s 9¾d
Sheet	lb 2s 0¾d
Wire	lb 2s 3d
COPPER Tubes	lb 1s 11¼d
Sheet	ton £247 0s 0d
H.C. wire and strip	ton £226 10s 0d
PHOSPHOR BRONZE	
Wire	lb 3s 1¾d
RUBBER, No 1 R.S.S. spot ..	lb 50d

Bristol Service Centre

Inauguration of New Display Facilities

The Lord Mayor of Bristol (Alderman F. A. Parish) performing the opening ceremony. On his left are Mr. S. F. Steward and Mr. E. C. Willis

WHAT must be one of the finest establishments of its kind, the Bristol Electricity Service Centre, was opened last week by the Lord Mayor of the city.

Nearly twenty years have elapsed since the Bristol Corporation secured a central site with the intention of erecting a headquarters for its Electricity Department which would include showrooms worthy of the city. Sir Giles Gilbert Scott was engaged as architect and construction began in 1937. In the early days of the second world war the shell of the building had been completed when the Bristol Aeroplane Co. became a temporary tenant and produced aero engines there.

When the Corporation's undertaking was vested in the new electricity authorities the building became the headquarters of the South Western Electricity Board and the Board decided to proceed with the scheme for using the ground floor as a service centre for the Bristol Sub-Area, a scheme which it has very successfully carried out. Much of the necessary material had already been bought before the war and although, for the rest, to-day's "austerity" rules have had to be observed, the Centre gives no obvious indication of lowered standards and is very handsomely finished and furnished.

Entrance is by the main door of the building, which is flanked by large curved display windows, into an entrance hall. The main hall is a very large apartment in which all kinds of appliances are disposed to the best advantage. Near the entrance is an inquiry bureau at the back of which is a large map of old Bristol painted by students of the West of England College of Art. At the opening ceremony visitors also saw an amusing pantomime backcloth designed and painted by Mr. J. Hutchinson Scott, of the Bristol "Old Vic." This was part of a

The entrance hall of the South Western Electricity Board's new Service Centre at Bristol

A view of the Service Centre showing the applications section in foreground. The ceiling lighting consists of 8ft fluorescent tubes with intermediate tungsten spotlights

special display (including a tree and garlands) which has been arranged for the Christmas season.

Off the main hall is a tastefully furnished sitting room, and steps from the main hall lead down to an attractive lighting display. This was laid out by Mr. T. Topping, of the Board's estates department, and is designed so that fittings (of which there are many good examples) can be individually demonstrated. At the further end of the hall is a lecture and demonstration theatre with a platform and ample seating accommodation.

The lighting installation was designed by Smith & Ansell, Ltd., on functional lines to conform with the architecture. It employs 8ft fluorescent lamps and intermediate tungsten-filament spotlights which can be adjusted to concentrate light on chosen displays.

Among the other features of the building which visitors were able to inspect was the billing department for the preparation and analysis of accounts and the adequate cooking equipment catering for the staff canteen.

It is the Board's intention to encourage the use of the Centre by local societies for their various functions and it has even offered the Bristol Branch of the Electrical Contractors' Association the opportunity of arranging an exhibition there.

At the opening ceremony on 29th November the chairman of the South Western Electricity Board, Mr. S. F. Steward, thanked the former Electricity Committee for conceiving and erecting the building, which had proved of great help to the Board in setting up its organization. He regretted that although generating plant was being installed at an unprecedented rate it was still necessary to reduce the load at peak times. It was the Board's aim to see that industry was not adversely affected and that domestic consumers were not inconvenienced. It also wanted to transfer as much load as possible to off-peak times and develop off-peak load to the full. The Board desired the Centre to be a focal point of electrical interest and service in Bristol.

Mr. Steward said that to demonstrate the fact that the ground floor of the building was devoted to the service of Bristol consumers they had asked the Corporation Housing Committee to select a typical Bristol housewife so that they could present her with a modern electric cooker. This presentation was made after the opening ceremony.

In a brief, witty speech the Lord Mayor declared the Centre open and Mr. E. C. Willis, manager of the Bristol Sub-Area (formerly manager of the Bristol Electricity Department), in thanking the Lord Mayor, gave some interesting facts about Bristol and the city's electricity undertaking.

After the opening ceremony the Lord Mayor and members of the former Electricity Committee were presented with ashtrays made from stone used in the construction of the building.

Lighting Technique

Re-equipment of L. S. B. Lecture Theatre

The re-equipped lecture theatre at the E.L.M.A. Lighting Service Bureau

THE redecoration and re-equipment of the lecture theatre of the Electric Lamp Manufacturers' Association's Lighting Service Bureau at 2, Savoy Hill, London, W.C.2, has been completed appropriately at a time when it should be of especial value in connection with the design of illumination schemes for the Festival of Britain. As an indication of the development in lighting technique, Mr. E. B. Sawyer, manager of the Bureau, mentioned at a Press inspection of the premises that the glareless illumination achieved in the lecture theatre was of an overall intensity of 120 ft-candles. In 1921 5 ft-candles was considered good lighting, while half that intensity was thought good enough for most purposes. We should now aim at securing installations of the order of 100 ft-candles.

Besides indicating some of the latest devices employed for educational purposes, Mr. Sawyer briefly reviewed the various methods of lighting incorporated in the new scheme. Above the stage "natural" fluorescent lighting has been employed in a louvred ceiling with overlapping cornices. A patterned glass chosen for its sparkling quality has been used in the luminous ceiling, part of which incorporates 5ft fluorescent tubes and the remainder 8ft tubes. On one side of the room, above a display of some of the thousands of types of lamps manufactured by E.L.M.A. members, fluorescent lamps have been utilized in the cornice; for purposes of comparison the cornice on the opposite wall is fitted with filament lamps. The general effect is improved by the adoption of a colour scheme in two tones each of peach and grey, with brick red curtains and a touch of blue in the sunken curve above the stage.

Industrial fittings are incorporated in the sides of the ceiling for demonstration purposes, while half way down each side of the ceiling a small recessed dome is lighted by a dimmer controlled indirect fitting. Among the built-in demonstrations, which are a feature of the redecorated room, are panels dealing with the colour rendering of fluorescent lamps and the operating principles of electric discharge lamps.

The co-operation of the Press in making the lighting of the Festival of Britain a success was urged by Mr. W. J. Jones, director of E.L.M.A., at a luncheon which followed the inspection. He mentioned that it would be some months yet before the report of the Commission on Monopolies relating to the electric lamp industry would be made public. His predecessor, Mr. C. W. Sully, gave some reminiscences of early lighting and indicated the remarkable developments, for which E.L.M.A. could claim much of the credit.

Farmers and Power Cuts

AT a meeting of the Skipton Branch of the National Farmers' Union, reference was made to the inconvenience caused by electricity cuts. Mr. R. T. Taylor, of Broughton, stressed the difficulty experienced by farmers who used electric milking machines when electricity was cut off without warning at milking time. Mr. Frank Snowden, of Cowling, a well-known poultry farmer, who mentioned that one day recently there had been three cuts at his farm, covering four hours in all, emphasized that it was a serious matter where incubators were in use. Mr. J. Boothman, of Halton East, said that farmers affected were advised to explain their position at the local electricity offices, and were told that the staff had instructions to do what they could for the farming community.

REPORT ON SWEDEN

Opportunities for British Manufacturers

THE return to the conditions of the buyers' market in Sweden means that British goods will now have to be sold on their merits at competitive prices. This view is expressed in a report on economic and commercial conditions in Sweden prepared by Mr. N. S. Roberts, Counsellor (Commercial) to H.M. Embassy at Stockholm, and published for the Commercial Relations and Exports Department of the Board of Trade by H.M. Stationery Office at 3s 6d net. Were some of the import quotas higher, it is said, United Kingdom manufacturers could exceed the present scale of exports to Sweden in many lines. Swedish industry is, however, highly efficient and is expanding.

Electrical machinery and other electrical goods are in particularly great demand, accounting for about one third of Sweden's imports of machinery and apparatus, as Sweden is already a highly electrified country. With the increased power which is planned to be developed during the next few years, prospects for the export to Sweden of industrial and domestic electrical goods on a considerable scale should be excellent. The almost complete disappearance of German electrical equipment from the Swedish market afforded a favourable opportunity for increased exports from the U.K. Now, however, German products are reappearing on a considerable scale.

Compliance with Regulations

Unfortunately it has been found that equipment from Anglo-Saxon countries does not comply with Swedish requirements. It is essential for British manufacturers wishing to export electrical equipment to Sweden to become thoroughly acquainted with the conditions imposed. Swedish safety regulations must be considered, its specified dimensions, in the metric system, must be adhered to, and before electrical equipment or apparatus can be offered for sale to the public it must first be approved by the authorities concerned, and receive what is known as the "S" mark. Copies of the Swedish regulations (in English) are available at the Commercial Relations and Exports Department (Tariff Section) Board of Trade.

The trade agreement for 1950 provides for United Kingdom exports to Sweden to an estimated value of about £70 million f.o.b. as compared with £49 million f.o.b. for 1949. The value of exports of electrical goods and apparatus from the U.K. to Sweden in 1949 was £1,566,280 and of electric motors and parts for machinery £277,663.

The Swedish electrical engineering industry is more or less divided into two distinct groups, one concerned with the production, transmission and distribution of electrical energy and the other with the production of telephone, telegraph and radio equipment, signalling and other communication apparatus. The largest Swedish organization in the first group is Allmänna Svenska Elektriska A-B (A.S.E.A.) and in the other group Telefon A-B L. M. Ericsson, Stockholm.

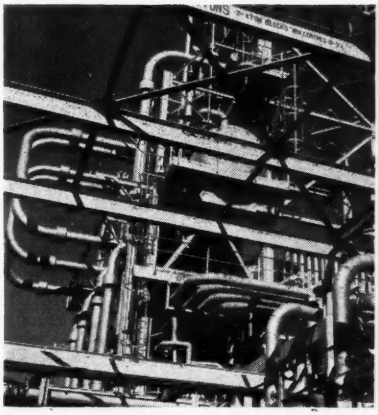
Domestic Appliances

Because of the availability of hydro-electric energy for general use all over the country, electrical household appliances of every conceivable kind are in fairly large production and demand. Electric heating and cooking apparatus is also included in the country's exports. Domestic refrigerators are in large production and A-B Electrolux has created a tremendous demand for its products. No Swedish household is considered to be complete without a refrigerator. Lamps are also produced on a large scale, and the annual demand for about 20 million lamps of normal types can be almost entirely met, but imports are still necessary. Accumulators and dry batteries are produced in sufficient quantities.

The Swedish electrical engineering industry works in close collaboration with the State authorities and insurance interests. National standardizing work is carried on by the Swedish Electrical Commission, which in turn is associated with the International Electro-Technical Commission. Local safety control has been exercised for many years by the Svenska Elektriska Materialkontrollanstalten (S.E.M.K.O.), Tulegatan 9-11, Stockholm, which is authorized by the State to test and pass electrical apparatus for sale.

Electricity in the Oil Industry—IV

Importance of Continuity of Operation in Refineries



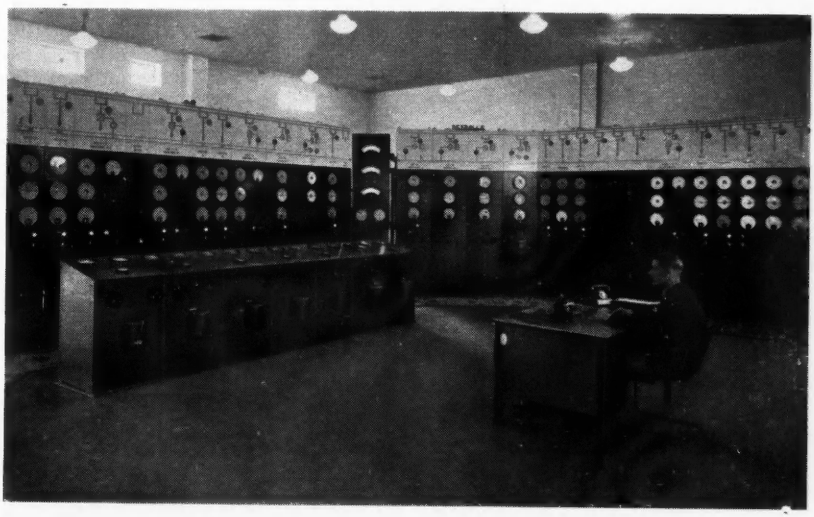
Section of thermal cracking unit, Abadan

IN the oil refineries even more than in the oilfields does the emphasis on the need for continuity of operations and for the utmost safety precautions become apparent. Actually these two objectives are closely inter-related, since the failure of a particular piece of apparatus speedily results in a dangerous situation, while on the other hand neglect to take into full consideration the risks inherent in handling highly inflammable materials may lead to damage or even the destruction of plant and consequent loss of output.

Apart from the danger involved, the stopping of some processes, even for a short time, may lead to the spoiling and wastage of a considerable amount of material. Once stopped it may be difficult and take some time to get the process going again. Furthermore, the stoppage will almost certainly dislocate the smooth flow throughout the rest of the refinery and cause a general congestion and slowing up of production.

For these reasons it will be appreciated that cost is of secondary consideration in

Control room, Abadan power station



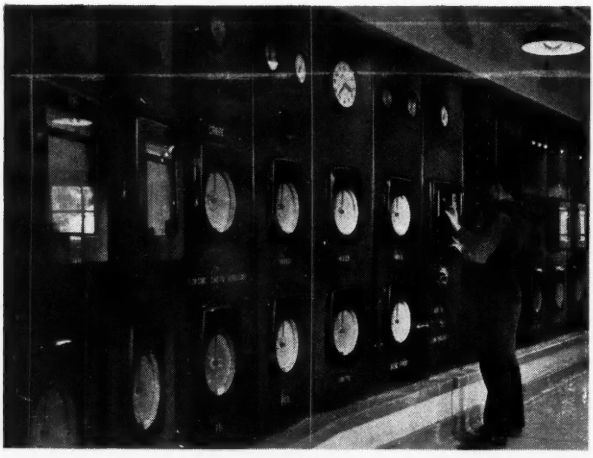
relation to safety and uninterrupted operation. The latter is safeguarded as far as possible by providing at least alternative sources of electricity supply and by duplicating practically every item of the plant. Elaborate electrical indicating and alarm systems also draw immediate attention to the failure of key apparatus.

With regard to securing maximum safety in the peculiarly hazardous conditions to be encountered in an oil refinery, there appears to be two schools of thought. One is that, to be on the safe side, virtually all apparatus, even in the so-called safe zone, should be of flameproof construction. The other is that, while employing flameproof gear in the danger zones, this precaution is superfluous and an unnecessary expense in the safe zone. In the latter case it is becoming customary, if the gear is not in the open air (under cover), to employ a vapour proof type and to house it in rooms in which a slight positive air pressure is maintained. Advocates of the all-flameproof methods see in this arrangement a potential source of danger should the fans maintaining the air pressure fail.

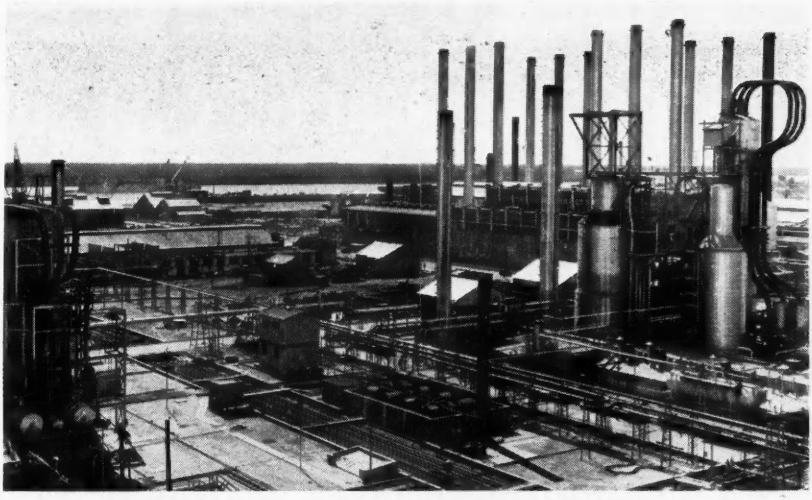
One further point in favour of the use of all-flameproof equipment is that refineries are never static and there is no guarantee that a motor or control gear required for a safe location will not be installed in future in some dangerous position. Therefore the oil companies are taking full advantage of flameproof motors, etc., and site them in accordance with the most convenient pipe runs. This is a great advantage as compared with a diesel engine which needs a large flameproof enclosure or has to be always sited in a safe position. It is much easier to shift the position of an electric motor and ancillary switchgear in accordance with changing requirements of refinery plant than to carry out similar modifications on steam driven pumps. However, no matter which attitude is adopted it is the general practice to-day to locate all motor control equipment in groups, with flameproof push-button control adjacent to the machinery.

To attempt in an article of this kind to describe all the processes using electricity in the oil refining industry would be out of the question. In the first place there is an almost unlimited number of derivatives of oil each requiring its own individual methods of treatment: every one of these would itself provide material for an article. Furthermore the installations at the new and extended refineries are still in most cases far from complete. We hope to describe some of these at a later stage and we shall content ourselves in the meantime with a brief indication of the extent of the use of electricity in the refineries, commenting on any special features of the installations we have visited.

Heat treating, cooling, compressing, introducing various gases or chemicals, catalytic cracking and mixing are the principal processes. Catalytic cracking, which utilizes a catalyst to change the molecular formation of the oil, enables a higher proportion of the finer grades of oil to be extracted and makes it possible to obtain any desired percentage of any finished product from a given feedstock without at the same time producing unnecessarily large quantities of other products: it is equally important at times

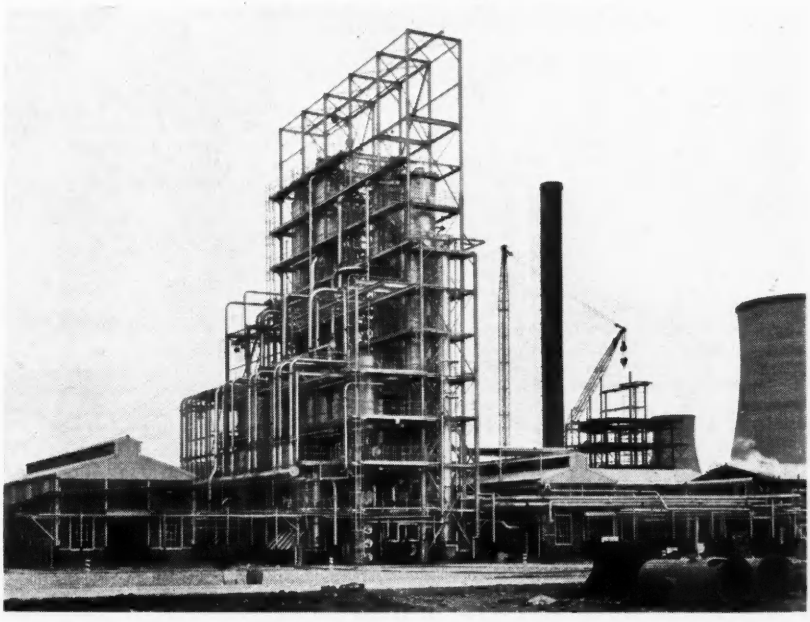


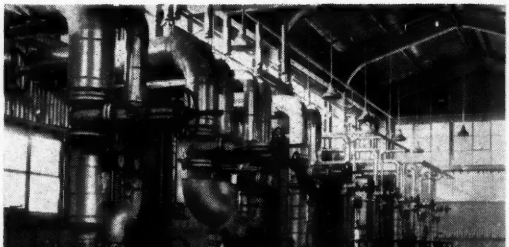
Control panel at Abadan distillation unit



3,000,000 gall a day distillation unit at Abadan, with power station beyond

Distillation unit at the Shell refinery at Stanlow





Kuwait Products pump house in the refinery

to convert feedstock almost entirely into, say, diesel oil as to produce a large percentage of aviation spirit.

Electricity's contribution to the work is largely confined to pumping, which is carried out before, during and after practically every process. In fact, in a modern refinery probably as much as 80 per cent of the power load is absorbed by pumps which may be anything in size from, say, 1 to 1,200 h.p. About one quarter of the pumping load is used for water circulation for cooling. The remainder of the power load is mainly taken by compressors. As processes are continuous there is also a considerable lighting load. Incidentally, it is worth noting that almost all equipment used is of the manufacturers' standard designs and little apparatus is made specially for the oil industry, except inasmuch as flameproof gear may be regarded as such. One of the few exceptions we have come across is constant current slush pumping equipment developed by the British Thomson-Houston Co., Ltd., to reproduce the same characteristics as a steam engine and be able to stall.

We thank the Anglo-Iranian and Shell organizations for supplying the photographs used in this article.

Assistance from North Scotland

THE North of Scotland Hydro-Electric Board stated last week that it was making a special effort to provide additional electricity to assist the industries of Central Scotland during the present power shortage. It was prepared to give a supply to the British Electricity Authority during the week of up to 120,000 kW with an agreed number of kWh. Every available generating set, efficient and inefficient alike, in the Board's Area had been brought into operation to achieve this output of power for the grid and at the same time supply the needs of the North of Scotland. The new hydro-electric stations at Loch Sloy, Clunie, Pitlochry and Fannich and the pre-war generating stations at Rannoch, Tummel Bridge and Loch Luichart were producing most of this power. The steam stations at Aberdeen and Dundee had been able to provide some power in excess of the needs of these cities and this also was transmitted to the grid.

Stations with a capacity of about 12,000 kW which have been classified as redundant or were retained only as stand-by because of their old generating machinery were being run again to achieve the greatest possible output, including the steam stations at Perth, Arbroath and Inverness and the diesel stations at Oban and Brora. The temporary diesel station at Cannich, built to supply electricity for the construction of the Affric hydro-electric scheme, is also producing power for the grid. Some of the most inefficient of these generating sets cost the Board 3d or more per kWh which is much more than it receives.

Anodizing Processes

FOLLOWING a settlement of a claim between the Minister of Supply and Alumilite & Alzak, Ltd., two patents concerned with sulphuric acid anodizing of aluminium, assigned to the Minister of Supply in February this year, have been allowed to lapse. The patents are: "Improvements in and relating to colouring treatment of anodic coatings of aluminium and its alloys" (British Letters Patent No. 474,609) and "Improvements in or relating to the anodizing of aluminium and its alloys" (British Letters Patent No. 476,161). The inventions of these two patents have been available to industry in this country since 30th April, 1950.

ELECTRICITY SUPPLY

Power Plant Contracts

Meter Certification in Glasgow

DURING the past month the British Electricity Authority has placed contracts for equipment for power stations, transforming stations and transmission lines valued in the aggregate at £1,464,029. The principal contracts include the following :—

Meaford power station : 132 kV transformers.—British Thomson-Houston Co., Ltd. Keadby power station, Lincs : 415 V switch and contactor gear.—Contactor Switchgear, Ltd. Structural steelwork.—Appleby-Frodingham Steel Co. Northampton power station : Circulating water pipes, inlet dock, pump house and other works.—Holloway Bros. (London), Ltd. Roosecote power station : Steel frame for turbine house and boiler house buildings.—Dorman, Long & Co., Ltd. Carrington power station : Structure for 132 kV switchgear.—A. Mark & Co., Ltd. Nechells " B " power station : 11 kV 1,000 MVA switchgear.—General Electric Co., Ltd. Watford substation : 60 MVA 132/33 kV transformers and earthing transformers.—British Electric Transformer Co. Hawarden substation : Two 45 MVA 132/33 kV transformers and earthing transformers.—C. A. Parsons & Co., Ltd.

Power Station Extensions Approved

Consent of the Minister of Fuel and Power has been received by the British Electricity Authority for extensions of the new power station at Carmarthen Bay, South Wales, and the power station at Cowes, Isle of Wight. The authorization covers the installation of two 60 MW turbo-alternator sets and nine 240,000 lb/hr boilers, at Carmarthen Bay ; and one 12·5 MW set and one 135,000lb/hr boiler at Cowes.

Lerwick Diesel Station

Particulars are given, in a White Paper published last week, of a Constructional Scheme promoted by the North of Scotland Hydro-Electric Board which has been approved by the Secretary of State for Scotland and laid before Parliament. The scheme provides for the construction of a 6,000 kW diesel generating station at Lerwick to meet the growing demand for electricity in the Shetland Islands. There were no objections to the scheme (Constructional Scheme No. 54), which is estimated to cost £248,000. The Fisheries Committee made no recommendations and the design of the power station was accepted by the Amenity Committee.

Meter Certification

The programme for installation of certified meters in the Glasgow Sub-Area of the South West Scotland Electricity Board has now been completed in so far as it applies to a.c. types, the total number of a.c. meters on circuit being approximately 280,000. There remain about 3,000 d.c. uncertified meters on circuit in the Sub-Area, and consumers are being changed to a.c. as quickly as present circumstances permit.

New Zealand Statistics

We have received from New Zealand a copy of the " Annual Statistics in relation to Hydro-Electric Development and Operation " for the year ended 31st March, 1949, from which the particulars given in the accompanying table have been abstracted. Of the 2,844·4 million

	1947-8	1948-9
kWh sold (millions)	2,036	2,278
Consumers	511,699	533,354
Sales per head (population) ..	1,110	1,216
" " " (consumers). . ..	3,978	4,271
Consumers per route mile	15·02	13·92
Connected load (million kW) ..	3·8	4·2
installed capacity (main plant), MW	509·2	586·7
" " (stand-by), MW	93·6	88·1
Electric ranges installed	180,936	200,692
Water heaters	212,482	234,309
Milking machines	35,687	37,079

kWh generated during the year 2,712 million was produced at hydro-electric stations. Working costs averaged 0·380d per kWh sold and total costs 0·763d, against which revenue averaged 0·830d.

Line Over Housing Site

Plans by the British Electricity Authority to construct an overhead line were discussed at a meeting of the Stockton-on-Tees R.D.C. It was stated that the B.E.A. had been asked by the Air Ministry not to bring the overhead line within three miles of the aerodromes at Thornaby and Middleton St. George. The proposed line would have to be taken over land at Eaglescliffe intended for housing developments. The B.E.A. proposed, however, to use extra high towers and with safeguards it would be possible to build houses under the line.

MALAYAN ELECTRICAL TRADE

Expansion in First Half of 1950

TRADE returns just issued for the first half of this year show that in spite of internal disorder Malayan imports and exports expanded generally and resulted in an export surplus for the first time since liberation. More than a third of the imports were supplied by the United Kingdom. Noteworthy features of the import trade were larger totals of telegraph and telephone apparatus and accumulators, with Germany and Australia participating to an increasing extent in the latter. More lighting materials were imported as a whole but the figures for lamps are not strictly comparable because of a change in classification. Holland was in evidence again in the radio trade and to a small extent in cables. The reduced total of generator imports was a feature of the machinery business. The Malayan dollar equals 2s. 4d.

Recovery from the damage caused during the war to power supply is not yet complete and available resources have been overtaxed. The Electricity Board set up in 1949 has been planning plant renewals and new stations at a cost of over £4 million spread over 1949/51 with further developments running to £14 million.

Class of Goods	Jan.-June, 1950 $ (000)	Inc. or dec. $ (000)
Automobile lamp bulbs	73	+ 32
From U.K.	21	+ 6
„ *U.S.A.*	35	+ 14
„ *Holland*	16	+ 13
Flash and torch lamp bulbs	766	+ 509
From Holland	109	+ 93
„ *U.S.A.*	528	+ 391
„ *Hongkong*	96	+ 22
Fluorescent lamps	115	— 63
From U.K.	30	+ 9
„ *Holland*	23	+ 9
„ *U.S.A.*	51	— 94
Electric lighting accessories	925	+ 126
From U.K.	722	— 24
„ *Australia*	17	+ 12
„ *U.S.A.*	87	+ 82
„ *Hongkong*	45	+ 38
Wires and cables, not telegraph or telephone, rubber insulated	1,061	— 423
From U.K.	1,041	— 430
„ *U.S.A.*	10	—
Ditto, insulation other than rubber	1,459*	+ 614
Ditto, telegraph and telephone	817	— 64
From U.K.	797	— 81
„ *Holland*	20	+ 20
Ditto, submarine	353*	+ 59
Electro-medical apparatus, X-ray and vacuum tubes	186	+ 116
From U.K.	83	+ 41
„ *U.S.A.*	73	+ 53
Ammeters, voltmeters, etc.	181*	†
House service meters	128*	†
Other electrical instruments not telegraph or telephone	25*	†
Electrical refrigerators and parts	1,143	— 447
From U.K.	665	+ 625
„ *U.S.A.*	475	— 1,062
Electric fans	837	+ 346
From U.K.	809	+ 407
„ *India*	6	— 44
„ *Japan*	5	— 2
„ *Italy*	7	+ 1
Accumulators	1,257	+ 544
From U.K.	950	+ 482
„ *Germany*	71	+ 71
„ *Australia*	207	+ 55
Batteries	122	+ 5
From U.K.	77	+ 35
„ *Hongkong*	42	+ 42

Class of Goods	Jan.-June, 1950 $ (000)	Inc. or dec. $ (000)
Batteries for hand flash lamps	363	— 265
From Canada	54	— 188
„ *U.S.A.*	155	— 175
„ *U.K.*	60	+ 51
„ *Hongkong*	82	+ 40
Radio receiving sets, excluding valves	2,058	+ 128
From U.K.	1,194	— 32
„ *Holland*	794	+ 126
„ *U.S.A.*	39	+ 35
Radio transmitting sets, excluding valves	370	— 292
From U.K.	355	— 292
„ *Hongkong*	14	+ 14
Radio valves	158	+ 26
From U.K.	135	+ 15
„ *Holland*	21	+ 16
Radio parts and accessories	615	— 37
From U.K.	512	— 47
„ *Holland*	63	+ 17
„ *U.S.A.*	18	— 21
Telegraph and telephone apparatus other than radio	2,104*	+ 728
Electrical goods and apparatus n.e.s.	1,080	— 381
From U.K.	970	— 217
„ Canada	10	— 8
„ *Holland*	23	+ 5
„ *U.S.A.*	48	— 38
Electric cooking and heating appliances	353	†
From U.K.	340	—
„ *Holland*	8	—
Convertors and transformers	381*	+ 186
Generators	238	— 571
From U.K.	172	— 179
„ *U.S.A.*	66	— 365
Motors, 25 h.p. and under	379	+ 14
From U.K.	354	+ 26
„ *U.S.A.*	18	— 15
Motors, 25 h.p. to 100 h.p.	114	— 19
From U.K.	104	— 18
„ *U.S.A.*	9	— 2
Motors over 100 h.p.	147	+ 41
From U.K.	124	+ 18
„ *France*	23	+ 23
Switchgear	602*	+ 202
Other electrical machinery	407	— 44
From U.K.	379	— 120
„ *U.S.A.*	28	— 1

*Mainly from U.K.

†Comparative figures not available.

THE "COLOMBO PLAN"

Power Development Proposals

THE principal electrical interest in "The Colombo Plan for Co-operative Economic Development in South and South-East Asia," prepared by the Commonwealth Consultative Committee (H.M. Stationery Office, price 3s), lies in the proposals for power development in the various territories surveyed.

India is dealt with first and the Committee says that although industrial development during the war led to an increase in the output of electricity to about twice the pre-war level there is still insufficient to meet the demand. Work is already in progress on three schemes of irrigation and power development which are expected to increase generating capacity by 708,000 kW. They are the Damodar Valley scheme (£37·5 million), the Hirakud (£22·5 million) and the Bhakra Nangal (£56·8 million) projects.

Among schemes in progress in Pakistan are the Rasul hydro-electric project and the Malakand hydro-electric extension. It is stated that the hydro-electric potential of the country is five or six million kW but only 9,600 kW has been harnessed and there is only 59,500 kW of thermal plant. Plans for the development of 200,000 kW of water power and 56,000 kW of thermal power, at a cost of about £48·5 million, are proposed.

In Ceylon it is intended to begin the damming of the Walawe Ganga in 1952 which will produce 10,000 kW of power as a "by-product" of an irrigation scheme. The first stage of the only hydro-electric scheme in the country is now almost completed. There will be an installed capacity of 25,000 kW and two further stages of 25,000 kW each are planned. Electrification of suburban railways is envisaged.

Industrial progress in the Federation of Malaya is being impeded by shortage of power. The Connaught Bridge power station, designed for an ultimate capacity of 80,000 kW, will be a first step towards remedying the shortage. During the six years which the Plan covers a number of hydro-electric schemes are to be put in hand and a grid is to be completed. Other projects include telecommunication services.

The Report stresses particularly the need of the countries included for technical advice and assistance, especially civil, electrical, mechanical and hydraulic engineers. Means of providing the external finance of these countries (estimated at almost £1,100 million during the six-year period) are put forward.

Board and Contractors Co-operate

IN Cardiff on Wednesday last week a joint conference took place, attended by about 120 representatives of South Wales electrical contractors and the staff of the South Wales Electricity Board. It was held under the auspices of the Liaison Committee between the E.C.A. and the Board founded shortly after the nationalization of electricity supply.

Mr. L. Howles, chairman of the Board and of the Committee, presided at the conference and was supported by the full Committee:—Mr. Edward Jones, deputy chairman, Mr. J. F. Smith, chief commercial officer, and Mr. A. J. Dalton, section head, representing the Board; with Messrs. R. L. Booth (Cardiff), T. E. Alger (Newport), T. J. S. Morgan and J. Smith (Swansea) representing the Electrical Contractors' Association. The guests included Mr. P. G. Wallis, president, E.C.A., Mr. H. J. Gibson, chief commercial officer, Midlands Electricity Board, and Principal Robert James, member, South Wales Board.

The afternoon session was devoted to papers presented by Mr. Booth ("The E.C.A. and What it Stands For") and Mr. Dalton ("Electrical Installations—the Way Ahead") which produced a valuable discussion.

In proposing the toast to the Committee at the dinner which followed, Mr. Wallis said the conference was the natural outcome of the happy relationship existing between the two bodies and he hoped the lead given by South Wales would be followed by similar functions throughout the country. Replies made by Mr. Howles and Mr. Booth emphasized the value of full and amicable co-operation to ensure that consumers secured adequate and safe wiring installations.

District Heating

A SCHEME for district heating at Darwen is being considered by the British Electricity Authority, according to a report in the *Northern Daily Telegraph*. The plan, authorized by the Darwen Corporation Act, 1948, provides for the generation of both steam and electricity. At first the scheme would be purely industrial, to provide steam from a central plant for heating and manufacturing processes in mills.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Morphy-Richards, Ltd., report a trading profit for the year to 30th June last of £151,912, as compared with £125,752 for the preceding year, and after providing for depreciation, etc., £39,105, unassessed liabilities £15,000 and taxation £59,487, the group profit is £42,102 (against £43,667). The profit appropriate to Morphy-Richards is £33,753 (against £39,792). The final dividend is 25 per cent making 40 per cent for the year on increased capital of £110,000. For the previous year the distribution was 160 per cent (on £27,500 capital).

Peto Scott Electrical Instruments, Ltd., reports a consolidated net loss for the year ended 31st March last of £8,558 (against a profit of £7,625) and a net loss of the holding company of £7,198 (against a profit of £7,052). The directors have decided not to pay a dividend on the £45,000 capital in respect of the year. The distribution for the preceding year was 7½ per cent. The holding company's carry-forward is reduced from £20,830 to £13,632.

Aerialite, Ltd., shows a consolidated trading profit for the year to 31st May last of £144,569, as compared with £146,157 for 1948-49, and after providing for taxation, etc., a net profit of £60,022 (against £59.554). The ordinary interim dividend was 62½ per cent (same), and the final is 50 per cent on £60,000 capital (against 87½ per cent on £32,000). The balance carried forward is £78,693.

Yarrow & Co., Ltd., report a revenue for the year to 30th June last of £236,370, as compared with £183,056 for the preceding year. Taxation requires £120,000 and the dividend for the year is 10 per cent, plus a bonus of 5 per cent, both tax free (unchanged). General reserve receives £100,000 and £87,102 is carried forward (against £127,271).

Christy Bros. (Chelmsford), Ltd., are offering to ordinary shareholders 50,000 additional £1 ordinary shares at 20s 6d each in the proportion of one in three. The proceeds will be applied to reducing the loan from the company's bankers. The new shares will rank for dividend as from 1st January next and will be entitled to one-quarter of any final dividend declared in respect of the year to 31st March.

The Plessey Co., Ltd., reports a profit on trading for the year ended 30th June last of £254,209, as compared with £261,965 for the previous year, and a profit, after providing for taxation, of £58,014 (against £84,194). It is proposed to pay a final ordinary dividend of 10 per cent, making 20 per cent for the year (unchanged), and to carry forward £120,804 (against £115,956 brought in).

Thomas de la Rue & Co., Ltd., are again paying an interim dividend of 15 per cent.

Lisbon Electric Tramways, Ltd., has declared an interim dividend of 2½ per cent. tax free (same).

Pye (Ireland), Ltd., has announced an interim dividend of 2½ per cent on capital increased by a 100 per cent scrip bonus (against 5 per cent).

Hick, Hargreaves & Co., Ltd., are paying an interim dividend of 2 per cent (unchanged).

Lightfoot Refrigeration, Ltd., has declared an interim dividend of 3 per cent (same).

George Kent, Ltd., are paying an interim dividend of 3 per cent (same).

Increase of Capital

Hobart Manufacturing Co., Ltd.—Increased by £300,000, in £1 ordinary shares, beyond the registered capital of £200,000. At 30th October, 1950, the Hobart Mfg. Co., of Troy, Ohio, U.S.A., held a majority of the issued shares.

Liquidations

Em-Vee Electric Co., Ltd.—Creditors' voluntary winding-up. Meetings 29th December at 23-26, Broad Street Avenue, London, E.C.2, to receive an account of the winding-up by the liquidator, Mr. H. Rainsbury.

Bankruptcies

W. J. Griffin, carrying on business at 2, Hinckley Road, Earl Shilton, Leics, radio and electrical dealer.—Trustee, Mr. E. E. V. Rowley, 20, Friar Lane, Leicester, released 9th November, 1950.

D. L. Smith, 9, Kensington Road, Coventry, lately carrying on business at Midland Bank Chambers, Cefn Road, Old Colwyn, Denbigh, electrical engineer.—Trustee, Mr. R. P. Booth, 5 Rumford Place, Chapel Street, Liverpool, appointed 23rd November.

STOCKS and SHARES

STOCK Exchange markets have been, and still are, violently shaken by the various items of news from the Korean battlefields. Last week, there was an extensive amount of realization in practically all the markets. If the selling was not quite that of semi-panic, it was sufficiently indiscriminate to make the Stock Exchange a very unhappy place in which to carry on. In those investment sections where speculation is seldom seen, the malaise did little damage to prices. Where anything in the nature of a speculative account had been built up, the influence of the crisis made itself heavily felt. The cost of the Defence programme foreshadows further burdens upon the financial capacity of the country. A little brightness is attracted every now and then when selling appears to have blown itself out and when the bargain-hunting buyers come more noticeably into evidence. But every day brings forth its own particular tendency in Stock Exchange markets, and what stands written to-day may be rendered completely outmoded by the happenings of tomorrow.

Falls on the Week

Associated Electrical Industries, after their sharp rise, went back to 81s 3d, B.I. Callenders to 36s 6d. E.M.I. to 18s 6d. Ericsson Telephones 46s 9d, Every Ready 28s, Hoovers 48s 6d, Johnson & Phillips 61s 3d, Aron 38s 9d, General Electric 81s, Lancashire Dynamo 96s 3d, Westinghouse Brake 61s 3d, are amongst others to show losses on the week. Tube Investments went back to 6 $\frac{5}{16}$. Indian utilities are dull: Calcutta Trams 28s 9d, Calcutta Electric 22s 9d and Madras 32s 6d. Oriental Telephones fell 2s 6d to 41s 3d. On the other hand, British Electric Traction deferred put on 40 points at 495. Automatic Telephones rose to 63s, London Electric Wire to 52s 6d and General Cables to 16s 3d.

British Electricity Stocks

Despite the sharpness of the recoil in gilt-edged prices, there still remains much of the appreciation which had accrued during the second half of this year. The temptation to secure capital profits may, indeed, have had a good deal to do with the extent of the setback. Between the end of June and of the third week in November, British Electricity 3$\frac{1}{2}$ per cent. for instance, had climbed from 99$\frac{1}{2}$ to 104$\frac{5}{8}$. The price reacted to 103$\frac{3}{4}$ during the new crisis. Over the same period, the two 3 per cent Electricity stocks had each gained more than 4 points, of which they have now lost about a point and a half, prices at the time of writing being 97 for the 1968–73 issue and 96$\frac{1}{4}$ for the 1974–77 issue. British Transport 3 per cent 1978–88 had as much as 7 points to its credit over the five months before the setback from 95$\frac{1}{2}$ to 92 xd.

Reliance-Clifton

Recent activity in the 5s ordinary shares of Reliance-Clifton Cables & Industrial Products took the price over 24s, as compared with the quotation of under 20s at the beginning of last month, shortly after the appearance of the annual report. This created a good impression by virtue of the expansion of profits and the large resultant additions to reserves, the dividend (for eight months) being maintained at an annual rate of 25 per cent. Further interest has been attracted to the shares by the chairman's review at the meeting a fortnight ago. He pointed out that over 80 per cent of the last earnings had been ploughed back into the business, and went on to indicate that this process had reached a scale where some adjustments might be necessary, both in the company's capital structure and in the dividend distribution. On the last dividend rate, the yield on the shares is £5 3s per cent.

Aerialite Report

This company's full accounts confirm that net profits of £58,000 after tax, for the year ended last May, came out within a few hundred pounds of the previous result. They cover rather more than twice the amount distributed in ordinary dividends. Having paid an interim of 62$\frac{1}{2}$ per cent, the company declared a free seven-for-eight share bonus and is giving a final 50 per cent on the capital so increased. On the present basis, the year's total is equivalent to 83$\frac{1}{3}$ per cent, a slight improvement on the former result. After rising to 9s, the 1s ordinary shares eased off to 8s 3d, which affords a yield of just under double figures.

Miscellaneous Matters

Recent new issues are depressed by general reluctance to take on fresh commitments, and by consequent selling of "rights" and allotments. Premiums on the new shares of British Oxygen and British Aluminium were reduced to 17s and 3s 9d respectively. Ferranti new second preference eased to 21s 6d. Peto Scott's decision to pass the ordinary dividend coincided with general market depression. The quotation of the 2s shares remains at 2s, but no bargains have been recorded since the announcement. Commodity shares parted company with commodity prices; copper, rubber and tin issues coming in for heavy profit-taking, while the two latter products themselves went to new heights.

NEXT WEEK'S EVENTS

Monday, 11th December

BIRMINGHAM.—Grand Hotel. Birmingham Electric Club. "Some Developments in Domestic and Commercial Refrigeration," by H. Brecknock.

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Centre. "The Development and Design of Electrical Control Gear for Machine Tools," by A. R. H. Thorne.

LONDON.—Savoy Place, W.C.2, 7 p.m. I.E.E. London Students' Section. Film night.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "The Planning of an Electricity Board's Distribution System," by G. O. McLean.

READING.—Great Western Hotel, 7 p.m. I.E.E. District Meeting. "Television Engineering," by D. C. Birkinshaw.

RUGBY.—E.M.E.B. Showrooms, High Street, 6.30 p.m. I.E.E. Rugby Sub-Centre. "Some Experience of a British Network Analyser," by G. Lyon.

STAFFORD.—King Edward Grammar School, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "The Cost and Efficiency of Earthing on Low- and Medium-Voltage Overhead Line Systems," by L. Gosland.

Tuesday, 12th December

BELFAST.—Queen's University, 6.45 p.m. I.E.E. Northern Ireland Centre. "The Cost and Efficiency of Earthing on Low- and Medium-Voltage Overhead Line Systems," by L. Gosland.

LEEDS.—B.E.A. Yorkshire Division, 1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "The Phase/Neutral System of Supply for Rural H.V. Distribution," by G. T. Garwood and G. J. Websdale.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. "The Effect of Friction on the Behaviour of Servo Mechanisms at Creep Speeds," by J. G. L. Michel and Dr. A. Porter.

Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6 p.m. Illuminating Engineering Society. "The Development of the Tungsten Lamp," by B. P. Dudding.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Centre. "The Control of Hydro-Electric Plant," by A. C. H. Frost and W. Brittlebank.

WIMBLEDON.—St. George's Hall, St. George's Road, 8.15 p.m. A.S.E.E. South West London Branch. "Colliery Electrification," by R. A. Frith, and "Industrial Psychology and the Electrical Engineer," by G. S. Gorringe.

Wednesday, 13th December

BIRMINGHAM.—James Watt Institute. I.E.E. South Midland Students' Section. Senior chairman's address, by D. H. Kendon.

Chamber of Commerce, New Street, 7 p.m. A.S.E.E. Birmingham Branch. "Modern Electro-Plating," by A. F. Brockington.

BRADFORD.—Midland Hotel, 7.30 p.m. A.S.E.E. Bradford Branch. "Stage Lighting and Effects," by J. H. Greenwood.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. Scottish Centre. "Design of Power Transformers to withstand Surges due to Lightning, with special reference to a New Type of Winding," by A. T. Chadwick, J. M. Ferguson, D. H. Ryder and G. F. Stearn.

FARNBOROUGH.—R.A.F. College, 7.30 p.m. I.E.E. Southern Centre. District meeting. "Magnetic Amplifiers," by A. G. Milnes.

HULL.—Y.E.B. Showrooms, Ferensway, 7.30 p.m. I.E.E. North Midland Centre. District meeting. "The Testing, Reconditioning and Servicing of Domestic Appliances," by H. Hobbins.

LIVERPOOL.—The Temple, Dale Street, 6 p.m. I.E.E. Mersey and North Wales Centre. "Some Aspects of Electric Propulsion," by E. L. N. Towle.

MAIDSTONE.—Royal Star Hotel, 8 p.m. A.S.E.E. Kent Branch. "Domestic Refrigeration," by R. Sisley.

SHEFFIELD.—Grand Hotel, 6.30 p.m. I.E.E. Sheffield Sub-Centre. "Some Electro-magnetic Problems," by Prof. G. W. O. Howe.

Thursday, 14th December

DUNDEE.—Royal Hotel, Union Street, 7 p.m. I.E.E. North-East Scotland Sub-Centre. Address by chairman of the Scottish Centre, J. Henderson.

LEICESTER.—E.M.E.B., Charles Street, 6.30 p.m. I.E.S. Leicester Centre. "The Electronic Flash Tube," by A. J. Meadowcroft.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilization Section. Junior members' night.

Caxton Hall, S.W.1, 2.30 p.m. Diesel Engine Users' Association. "Report on Heavy-Oil Engine Working Costs, 1948-49."

Caxton Hall, S.W.1, 6 p.m. Engineers' Guild, Metropolitan Branch. Film "Atomic Physics."

MANCHESTER.—Town Hall Extension, 6 p.m. I.E.S. Manchester Centre. Presidential Address, by L. J. Davies.

SWANSEA.—Plaza Cinema, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "The Phase/Neutral System of Supply for Rural H.V. Distribution," by G. T. Garwood and G. J. Websdale.

Friday, 15th December

ABERDEEN.—Robert Gordon's Technical College, 7.30 p.m. I.E.E. North-East Scotland Sub-Centre. "Analogies," by Prof. M. G. Say.

BIRMINGHAM.—Arden Hotel, New Street, 7 p.m. Society of Instrument Technology, Midland Section. "Some Aspects of the Problems of Instrumentation in a Large Refinery," by S. W. J. Wallis.

CARDIFF.—I.E.E. Western Utilization Group. Annual dinner.

LEICESTER.—College of Technology, 6.30 p.m. I.E.E. East Midland Centre. "Modern Discharge Lamps," by A. E. Bird. (Joint meeting with the Leicester Association of Engineers.)

LONDON.—Royal Society of Arts, John Adam Street, W.C.2, 7.30 p.m. Junior Institution of Engineers. Inaugural meeting of 70th Session. Presidential address by Rear-Admiral D. J. Hoare.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1946

17704. Muirhead & Co., Ltd., and Bell, J.—Picture telegraphy. 13th June, 1947. (648372.)

21769. Soc. Francaise Radio-Electrique.—Systems for radio navigation. 19th July, 1946. (648246.)

28234. Johnson & Phillips, Ltd., and Hayward, A. T.—Apparatus for winding tape on cables. 22nd September, 1947. (648249.)

30447. Columbia Broadcasting System, Inc.—Television systems, more particularly for colour television. 11th October, 1946. (648304.)

31935. British Thomson-Houston Co., Ltd. (General Electric Co.).—Phase-shifting circuits. 28th October, 1946. (648305.)

32930. Rediffusion, Ltd., and Adorian, P.—Systems for radio-directing the movement of aircraft with respect to a predetermined path. 8th December, 1947. (648256.)

34136. Okolicsanyi, F.—Conversion of electrical signals into luminous images and vice versa. 24th February, 1948. (648257.)

35894. Radio Corporation of America.—Frequency converter circuits for multi-band superheterodyne receivers. 4th December, 1946. (648259.)

1947

1534. British Thomson-Houston Co., Ltd.—Mechanism for driving a sound film or other flexible band. 16th January, 1947. (648260.)

3316. British Thomson-Houston Co., Ltd. (General Electric Co.).—Dielectric films and electric capacitors. 4th February, 1947. (648374.)

3707. Standard Telephones & Cables, Ltd. (Federal Telephone & Radio Corporation).—Telecommunication system. 7th February, 1947. (648375.)

5683. Standard Telephones & Cables, Ltd., and Fitch, C. K.—Manufacture of electric discharge tubes. 27th February, 1948. (648376.)

9067. Standard Telephones & Cables, Ltd.—Electron-discharge tube circuit. 3rd April, 1947. (648382.)

14443. Compagnie Générale de Telegraphie Sans Fil.—Ion generators. 30th May, 1947. (648261.)

15001. Standard Telephones & Cables, Ltd.—Antenna. 6th June, 1947. (648262.)

18500. Standard Telephones & Cables, Ltd., and New, A. A.—Electric insulating materials. 9th July, 1948. (648265.)

21829. Electroflo Meters Co., Ltd.—Pump control systems. 8th August, 1947. (648316.)

22889. British Thomson-Houston Co., Ltd.—Projection of light rays. 18th August, 1947. (648271.)

23470. Kay, J. M., and McLeod, T. S.—Electrical generating apparatus. 24th August, 1948. (648272.)

24107. Marconi's Wireless Telegraph Co., Ltd.—Electron-discharge tubes. 1st September, 1947. (648274.)

25858. Radio Corporation of America.—Slot antenna systems. 23rd September, 1947. (648277.)

26418. Fkg. F. Kesselring Geratebau Akt.-Ges.—Electromagnetically-actuated contact apparatus for use with variable current. 30th September, 1947. (648396.)

27279. British Thomson-Houston Co., Ltd.—Frequency-response circuits. 10th October, 1947. (648278.)

28873/4. Hoover, Ltd.—Suction cleaners. 29th October, 1947. (648282/3.)

28990. Westinghouse Electric International Co.—X-ray apparatus. 30th October, 1947. (648284.)

29623. Radio Corporation of America.—Circuit-arrangements for establishing the direct current level in television systems. 6th November, 1947. (648326.)

31943. British Thomson-Houston Co., Ltd.—Dynamo-electric machines. 3rd December, 1947. (648402.)

32699. Electrical Instrument Co. (Hillington), Ltd., Stangel, H., and Morris, W.—Electrical temperature-indicating instruments, used in combination with thermo-couples. 12th April, 1948. (648286.)

33268. Brush Development Co.—Transducing device having an electromechanically responsive dielectric element. 17th December, 1947. (648403.)

33269. Brush Development Co.—Bender type electro-mechanical device with dielectric operating element. 17th December, 1947. (648404.)

33621. Standard Telephones & Cables, Ltd.—Electron-discharge apparatus. 19th December, 1947. (648291.)

34656. Tesla Electrical & Radio Industry, National Corporation.—High-pressure metal-vapour discharge tube for d.c. operation. 30th December, 1947. (648334.)

1948

1459. Nevelin Electric Co., Ltd., and Bertele, H. C.—Electric gaseous discharge rectifiers. 17th January, 1949. (648454.)

3286. British Thomson-Houston Co., Ltd., and Wood, C. W.—Sockets for two-pin caps for electric discharge lamps. 7th March, 1949. (648464.)

5952. Director of the Office of Technical Services of Department of Commerce.—Electromechanical delay lines. 27th February, 1948. (648474.)

6920. Fairey, Sir C. R.—Wind-driven power generators. 21st February, 1949. (648363.)

12088. Standard Telephones & Cables, Ltd., and Henisch, H. K.—Manufacture of electrical semi-conductors. 20th May, 1949. (648423.)

12662. Wembley Electrical Appliances, Ltd., and Robertson, J. C.—Fluorescent and like lamp fittings. 6th May, 1949. (648426.)

15957. British Thomson-Houston Co., Ltd.—Electric detector of vapours and the like. 14th June, 1948. (648367.)

19041. British Thomson-Houston Co., Ltd.—Dynamo-electric machines. 15th July, 1948. (648490.)

19396. Milne, J. T. G., Westwood, P., and Fricker, J. H.—Variable inductance coils. 20th July, 1949. (648431.)

21355. Cope, W. W.—Electric motor driven chiming and striking mechanism of clocks. 7th September, 1949. (648495.)

22665. Metropolitan-Vickers Electrical Co., Ltd., Gray, A. H., Fenwick, D. R., and Kuyser, J. A.—Indication and control of the stability of synchronous dynamo-electric machines. 19th August, 1949. (648498.)

23007. Westinghouse Electric International Co.—Power plants. 1st September, 1948. (648501.)

23069. General Electric Co., Ltd., and Villiers, W. A.—Joint-making packing. 1st September, 1949. (648434.)

23302. Robertson, D. R., and Sampietro, A. C.—Electromagnetic slip couplings. 28th July, 1949. (648502.)

23771. Clarke, Chapman & Co. Ltd., and Shortt, J. S.—Sequence control switching devices for conveyors. 7th October, 1949. (648503.)

26200. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Charge storage electrodes for use in television or like systems. 7th October, 1948. (648509.)

26608. Londex, Ltd., and Besson, A. P.—Light-sensitive signalling devices. 13th October, 1949. (648512.)

29215. Philips Electrical, Ltd., and Klasens, H. A.—Electrical condensers. 21st October, 1949. (648520.)

29307. Westinghouse Brake & Signal Co., Ltd., and Simmons, A. W.—Indication devices for communication apparatus on railway vehicles. 26th September, 1949. (648521.)

30263. Cinema-Television, Ltd., and Freeman, G. S. P.—Television pick-up tubes or the like. 20th October, 1949. (648523.)

30752. General Electric Co., Ltd., Lewis, D. L., and Rycroft, J. L.—Electric heating elements. 25th November, 1949. (648369.)

30761. Ceag, Ltd., and Plummer, R. J.—Electrical storage batteries. 9th March, 1949. (648524.)

31105. Incandescent Heat Co., Ltd., and Howard, J. R.—Thermally sensitive resistor suitable for controlling an electric circuit. 29th November, 1949. (648525.)

32478. Teddington Controls, Ltd., and Bush, E. J.—Electric-switch actuating mechanisms. 8th December, 1949. (648202.)

32494. Monolithic Dolomite, Ltd., and Booth, C.—Construction of basic linings for electric and other high-temperature furnaces. 23rd November, 1949. (648204.)

32610. British Insulated Callender's Cables, Ltd., and Massey, S.—Protective devices for electric circuits. 15th December, 1949. (648207.)

32718. General Electric Co., Ltd., and Rycroft, J. L.—Electric heating elements. 9th December, 1949. (648211.)

33069. Dowty Equipment, Ltd., and Snell, M. S.—Push-button electric-switches. 22nd December, 1949. (648221.)

33166. Metropolitan-Vickers Electrical Co., Ltd. (General Electric Co.).—Commutators for dynamo-electric machines. 23rd December, 1948. (648224.)

33208. Neale & Sons, Ltd., J., and Neale, M. R.—Electric inspection lamps. 23rd December, 1949. (648227.)

33214. Cocking, T. B., and Brain, A. E.—Variable-electric condensers. 24th December, 1949. (648228.)

33255. Waugh, A. K.—Immersion heaters. 5th December, 1949. (648230.)

33284. Morris Motors, Ltd., Brown, R. J., and Bridle, J. H.—High-frequency induction heating apparatus. 6th December, 1949. (648231.)

33338. Revo Electric Co., Ltd., Felton, A. E., and Crawford, A.—Electric socket connectors. 25th December, 1948. (648232.)

33396. Western Electric Co., Inc.—Radio receiving circuits. 29th December, 1948. (648235.)

1949

18527. Metropolitan-Vickers Electrical Co., Ltd.—Electrical protective systems. 13th July, 1949. (648445.)

22946. Bozdech, J.—Method of and a device for indicating high-frequency voltages. 5th September, 1949. (648448.)

26807. Heaton, A. R., Struszynski, W., and Buckingham, J.—Radio frequency wattmeters. 19th October, 1949. (648450.)

Distribution of Industry

By JOHN LAWES

CONCERNS considering the establishment of factories in a "Development Area" may be entitled to receive assistance under the Distribution of Industry Act, 1950, which amends the 1945 Act of the same name and has recently come into force. The 1945 Act gave the Treasury limited powers to make grants or loans towards the capital equipment costs of concerns in Development Areas. These powers are extended by the new Act which provides that industrial concerns proposing to establish themselves in a Development Area may apply to the Board of Trade for financial assistance. The Board, if satisfied that there are "exceptional circumstances which render it expedient" may make a grant in respect of "expenditure or loss arising in connection with the establishment or transfer" of the undertaking.

Expenditure qualifying for a grant will be that resulting from the physical removal of plant or stock, and the initial loss which, through being compelled to employ "green" labour, a concern may suffer on its establishment in a Development Area. Those concerns who wish to take advantage of the amendment brought into effect by the 1950 Act should consult the Board of Trade before they conclude arrangements for their establishment in a Development Area. In particular, the approach should be made to the Board before a lease of premises from the trading estate company has been executed.

The Act also gives additional indirect assistance by allowing the Minister of Labour to make grants to employees who are being transferred to a new undertaking set up by their employer in a Development Area, to assist them to meet removal and resettlement expenses.

Electronics Exhibition

THE Institution of Electronics, Midlands Branch, will hold its second annual exhibition of industrial electronics in the Midlands, in Birmingham from 1st to 6th January next. Tuesday, 2nd January, has been set aside for a private trade preview. Free admission tickets for the preview are obtainable from the chairman, Institution of Electronics, "The Orchard," Beech Road, Bournville, Birmingham, 30.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Belfast.—5th January. Corporation. Electricity Department. Stores, including transformers, switchgear, cables, street lighting fittings, cookers, etc. (See this issue.)

Chester.—2nd January. Corporation. Renewal of Town Hall electrical installation. (See this issue.)

Darlington.—R.D.C. Electrical installations in 10 houses at Sadberge. J. F. Sweeten, 43, Geneva Road, Darlington.

Egypt.—19th December. Cairo Electricity and Gas Administration. Supply and laying of an underground cable line, together with associated switching stations, between Cairo North power station and the Egyptian broadcasting station at Abu Zabaal. (C.R.E. (I.B.) 7151/50. Ten/1920.)*

Leeds.—31st January. Regional Hospital Board. Installation of mechanical and electrical services at former Military Hospital at Fulford Hospital, Naburn, York. (See this issue.)

Luton.—20th December. Corporation. Electrical installations in seventy-three houses. (See 1st December issue.)

New Zealand.—3rd April. State Hydro-Electric Department. Steel cored aluminium transmission line conductor and accessories for Napier & Christchurch districts. (C.R.E. (I.B.) 70674/50. Ten/1922.)*

Southern Rhodesia.—15th December. Government Central Mechanical Equipment Department. Storage batteries. (C.R.E. (I.B.) 71456/50. Ten/1919.)*

Whitley Bay.—U.D.C. Electrical installations in 46 houses on the Foxhunters' site. Surveyor, Council Offices.

Winchester.—28th December. Corporation. Two 100 h.p. diesel engines and one 100 h.p. electric motor for pumping station. (See 1st December issue.)

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

ORDERS PLACED

Durham.—County Education Committee. Installation of electricity at Stockton Grange Farm and two smallholdings (£346).—A. Anderson & Son, Ltd., Middlesbrough.

Houghton-le-Spring.—U.D.C. Apparatus for new houses:—Reflector fires.—B. L. Oliver, Birtley. Electric cookers and wash-boilers.—J. Gledson & Co., Ltd., Newcastle-on-Tyne.

Newcastle-on-Tyne.—Education Committee. Electrical installation at Montagu Primary School (£5,233).—T. Mitchelson (Electrical), Ltd., Gateshead.

Northumberland.—Education Committee. Electrical installation at Blyth South Farm New County Modern School (£6,041).—B. French, Ltd., Easington.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Acton.—Science block at Technical College, Woodlands Annexe (£500,000); Middlesex county architect.

Aldridge (Staffs).—Houses (72), Walton Road, for U.D.C.; United Constructions (Walsall), Ltd., 54, Green Lane, Walsall.

Ashford (Kent).—Houses (132), Musgrove Farm estate (£171,181) for R.D.C.; G. E. Wallis & Sons, Ltd., builders, Maidstone.

Bakewell.—Houses (38) for R.D.C.; A. Lowcock, architect, King Street.

Barnsley.—School, Summer Lane; J. Holmes (Builders), Ltd., 54, Queen's Road, Doncaster.

Bath.—Block of 13 flats, Paragon; Tew, Pope & Oliver, architects, 7, Northumberland Buildings.

Bexley.—Dwellings (76), Royal Park Estate No. 2 (£95,804); S. G. & A. Agombar, builders, 353a, Norwood Road, London, S.E.27.

Birkenhead.—Extensions, Litherland Tanning Co., Ltd., Hawthorne Road; Medcalf and Medcalf, architects, 3, Stanley Street, Liverpool.

Birmingham.—Offices for National Assistance Board, Erdington; S. W. Slaughter & Sons, Ltd., builders, 55, Pershore Street.

Bridgend.—County primary school, Litchard Terrace; county architect, Glamorgan County Hall, Cardiff.

Cannock.—Houses (47), Brewood and Featherstone, for R.D.C.; J. P. Roberts, clerk, Council Offices, Penkridge, Stafford.

Carlisle.—Large extensions to works; Carr & Co., Ltd., Caldewgate.
Houses (350); city engineer, 18, Fisher Street.

Charing (Kent).—Houses (44), Town Mead estate, for West Ashford R.D.C.; J. R. Mann, architect, 4, Kingsdown Chambers, Tankerton Circus, Whitstable.

Colchester.—Houses (60). Shrub End; borough surveyor.

Coleshill.—Factory, Station Road; British Timken, Ltd., Northampton.

Felling-on-Tyne.—Houses (200) for U.D.C.; D. W. Green, housing architect.

Gillingham (Kent).—Shops, maisonettes and flats, Twydall Lane; borough surveyor, Municipal Buildings.

Glasgow.—Extensions to Southern General Hospital, Regent Street, for Western Regional Hospital Board; F. Maclson, architect, 64, West Regent Street.

Gloucester.—School, Lower Tuffley; city architect, Suffolk House, Greyfriars.

Hereford.—Houses (72), Putson; city surveyor.

Factory, Tram Inn site; Prailles Motors, Ltd., Holmer Road.

Knutsford.—Extensions for Waterproof Paper Co., Ltd.; L. Brown & Sons, Ltd., Wilmslow.

Leamington Spa.—Houses (58), Whitnash estate; Rayner and Fedeski, architects, 28, The Parade.

Llanfairfechan.—Houses (35), Tyddyn Drychin, for U.D.C.; Edward Jones, Penmaenmawr.

London.—ISLINGTON.—Flats (108) and maisonettes, Highbury New Park; E. C. P. Monson, architect, 120, Finsbury Pavement, E.C.2.

LEWISHAM.—Works extensions; Holmes Plating Co., Ltd., Blackheath Grove.

STEPNEY.—Dwellings (77), Hughes Mansions, Vallance Road reconstruction scheme; borough surveyor, Municipal Offices, Duval Street, E.1.

Middlesbrough.—Clinic, Thorntree (£12,500) and holiday home for mothers (£10,000); borough engineer.

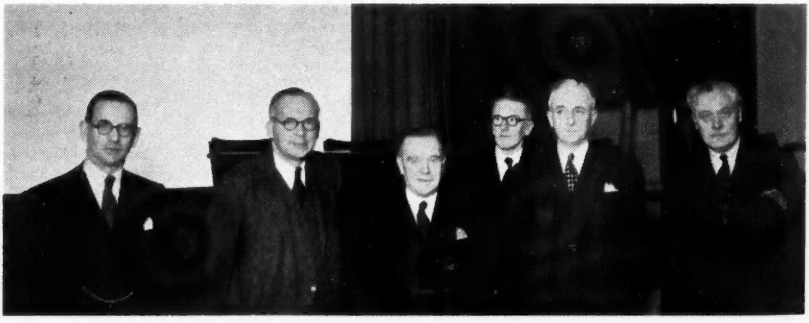
Wimborne.—Modern school, Pamphill; C. P. Brutton, clerk, County Hall, Dorchester.

Wolverhampton.—Houses (94), Moreton estate; director of housing, Town Hall.

Wrexham.—Primary and infants' schools, site near Deva Way, Queen's Park; G. D. Wiles, county architect, Grove Park, Wrexham.

Electrical Equipment for Rugby College

SINCE 1931, when the British Thomson-Houston Co. earmarked £100 as a gift towards further education in Rugby, the Rugby College of Technology and Arts has had generous support from the company. On 28th November a ceremony at the College marked the latest chapter in this story of generosity and farsightedness. In the presence of the Minister of Education, Mr. George Tomlinson, electrical engineering equipment estimated to be worth more than £20,000 was formally handed over to the College.

Among those present were Councillor E. T. Hobley (Mayor of Rugby), Sir Archibald Gill (president, I.E.E.), Professor Willis Jackson (London University), Professor W. John (London University), Mr. H. Shelley (chief technical inspector, Ministry of Education), Mr. H. W. French (technical inspector, Midland Area, Ministry of Education), Mr. W. Cooper (principal, R.C.T. and A.), Sir Felix J. C. Pole (chairman, B.T.H.), Mr. E. H. Ball (managing director, B.T.H.), Mr. L. J. Davies (director of research and education, B.T.H.), and Mr. H. Jack (director, chief electrical engineer, B.T.H.). Alderman W. S. Howard (chairman of the Warwickshire Education Committee) presided, and the gift was formally accepted by the principal of the College (Mr. W. Cooper) on behalf of the governors. Earlier, the Minister and other visitors were entertained to lunch by the company, with the chairman of the British Thomson-Houston Co. (Sir Felix J. C. Pole), in the chair. The lunch was followed by a brief visit to the Apprentice Department of the works.

A group in the lecture theatre of the B.T.H. Education Department at Rugby. Left to right:—Alderman W. S. Howard, Mr. L. J. Davies, Mr. George Tomlinson, Mr. W. Cooper, Mr. E. H. Ball and Mr. H. Shelley